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WHOLE No. 3111

NEW YORK, SATURDAY, OCTOBER 20, 1917

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Quick Carburetor Repair Made Possible

They Lacked a Number of Special Tile
They Used Crushed Old Fire Brick and

HYTEMPITE

In re-lining this carburetor head the company installing same was short a number of special tile.

A rammed-up material of crushed old fire brick with HYTEMPITE was used in place of these missing tile.

A wooden form was constructed, and when the brick work was finished, the head was replaced and the form burned out.

A special tile was also missing for the up and down make connections—a form was made, and crushed old fire brick and HYTEMPITE was rammed around the form taking the place of the missing tile—and the sleeve was complete.

Hundreds of gas companies use HYTEMPITE for bonding and repairing fire clay retorts or silica brick work, making special tile, rammed-in linings, etc., etc.

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U. G. I. Vertical Retorts

The best system of coal carbonization
in America today

Figures prove this and the guarantees of

THE UNITED GAS IMPROVEMENT CO., Philadelphia

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The Gas Machinery Company

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COAL GAS PLANTS **WATER GAS PLANTS**

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Vol. CVII, No. 16 NEW YORK, OCTOBER 20, 1917 Whole No. 3111

Sub-Committee on Coal-Tar By-Products Issues Condensed Report on Recovery of Toluol from Gas Works

Important and Eagerly Awaited Report Discusses Financing and Construction of Light Oil Plants—Describes Method of Recovery that Has Stood the Test of Time—Willingness of Companies to Assist the Nation

If, on statement of the facts and estimates as herein set forth, the Government needs the toluol, the Sub-Committee on Coal-Tar By-Products in submitting its report on the recovery of toluol from gas works to the chairman of the Committee on Chemicals at Washington, recommends one way of accomplishing this object, as follows: That contracts should be made by the Government with the respective gas companies for the full production of at least one year, allowing in the price sufficient amount to amortize the cost of such plants. This cost cannot now be accurately determined for reasons set forth in the report, and would rest largely upon the action of the Government in determining the price for the steel, castings, pipe, etc. Further to facilitate the necessary financing, the Government should be willing to advance the money for amortization during the construction period.

The sub-committee calls attention to the fact that in the description of processes there has been given a practical method of recovery that has been in successful operation for several years. It does not want to be understood as declaring this to be the best possible in all details.

The report, which is published as follows, takes up the following questions submitted by Major J. T. Crabbs, U. S. A., retired.

1. Objective

(a) How much obtainable?
(b) What will it cost for equipment?
(c) How far down the line should we go?
(d) Period one year's use.

2. Operative

(a) Descriptive detail of process. (1) Water gas. (2) Coal gas.
(b) Detail of standard equipment for different plants by class.
(c) Bill of equipment required for standard unit at present prices—multiplying to meet needs for each plant.
(d) Scheme for refining by districts.
1. Fractionation scrubber oil.
2. Fractionation crude toluol.

3. Statistical

(a) Location.
(b) Name of company.
(c) Kind of gas (water or coal).
(d) Monthly production, January to December inclusive.
(e) Type of equipment.
1. Number of units.
(f) Type of gas oil or fuel. (Origin.)
(g) Available equipment for scrubbing.
(h) Available still apparatus.
(i) Standard (candle or B.t.u.) required.
(j) Average B.t.u. of gas produced.
(k) Willingness to scrub.
(l) Is scrubber oil available?

How Much Obtainable?

The following statement is the result of a questionnaire sent out to about 75 of the largest gas companies.

The estimate is based on 1.6 per cent of the gas oil used in water gas manufacture. We know that this is possible in plants using 3.5 gal. of gas oil, or more, per thousand feet of gas made. Some of the companies, however, are using less than 3 gal. per thousand, and there has been no plant erected for the recovery of toluol in such plants. We have no reason to doubt that the proportion of toluol recoverable from gas changes for these smaller quantities of gas oil used.

It is estimated that there can be produced 7,314,390 gal. additional of pure toluol per year from the gas companies in the following cities of this country.

New York, New York and Richmond, Brooklyn, Chi-

cago, Philadelphia, Boston, Detroit, Jersey City, Newark, Los Angeles, Paterson, Minneapolis, Milwaukee, Providence, New Orleans, Portland, Oregon; Omaha, New Haven, Atlanta, Seattle, Grand Rapids, Lynn, Cambridge, Elizabeth, Denver, Springfield, Atlantic City, Allentown, Worcester, Albany, Richmond, Hartford, Bridgeport, Fall River, Malden, Wilmington, Houston, Utica, Pawtucket, Reading, New Bedford, Troy, Lowell, Buffalo, Waterbury, Lawrence, Birmingham, Binghamton, Manchester, Peoria, East St. Louis, Nashville, Salt Lake City, Portland, Maine; San Antonio, Jacksonville, Charleston, Schenectady, Wilkes-Barre, Savannah, Tacoma, Trenton, South Bend, Haverhill, Brockton, Chester, Lansing, Cedar Rapids, Sioux City, Hammond, Peru, Poughkeepsie, Waterloo, Madison, Ardmore, San Francisco and Oakland, Jackson, Pittsfield, Battle Creek, St. Louis, Mo.

This is estimated on the basis of 1.6 per cent of gas oil used in water gas manufacture, and 0.03 of a gal. per M. of coal gas.

From the foregoing list of plants installation for recovery of toluol is now either going in, or a plant is operating at the following points: Chicago, Jersey City, Newark, Paterson, Minneapolis, St. Louis; equivalent to 1,224,000 gal. of the foregoing total, leaving a balance still obtainable of 6,090,390 gal.

Of the remaining plants, the following fifteen plants would give 3,274,000 gal. of toluol, or 45 per cent of the amount possible from the plants enumerated above—7 New York Consolidated, 5 Brooklyn Union, Philadelphia, Boston, Detroit.

No definite figures can be given of the cost of equipment until we can ascertain accurately at what price sheet steel and steel shapes and castings, pumps, etc., can be purchased.

We have not included in the list under any plant that will produce less than 10,000 gal. of pure toluol per year. There are a number of other plants that could produce 5,000 gal. per year, but they could not have recovery plants installed, except at very high cost. Many such plants will be found to be lacking in real estate for the installations, and it is doubtful whether any of the present designs of plants are best adapted.

We would, therefore, recommend that we do not consider these plants until the Government shows a desire to get more toluol than can be produced by the companies enumerated. If that is the case, we would advise that experiments be carried on at once, in some of these plants to determine whether the efficiency of certain forms of apparatus recommended for smaller plants would be great enough to warrant their installation.

Not included in the companies here enumerated, and excluding also the gas companies supplied with oven gas from which the light oil has already been removed, there are some 800 other companies that will manufacture in the aggregate during 1918 about 55,000,000 M. cu. ft. of coal gas and water gas in the proportion of 80 per cent water gas and 20 per cent coal gas, equivalent to 3,300,000 gal. additional toluol from all companies.

TOTAL RECOVERY OF TOLUOL FROM GAS WORKS AS CONTEMPLATED IN THIS REPORT

Gas works recovering toluol prior to Aug. 1, 1917.	1,733,718 gal.
Gas works recovering toluol or erecting recovery plants between Aug. 1 and Sept. 16, 1917....	1,224,000 gal.
Gas works as shown above not started on toluol recovery	6,139,000 gal.
Total.....	9,096,718 gal.

OPERATIVE

We think it advisable in describing the apparatus recommended for the recovery of toluol, to divide it into two parts: "A." The process of removing the light oil from the gas, stripping the light oil from the wash oil and fractionating the light oil; and "B"; refining the toluol fraction of the light oil.

APPARATUS FOR PLANTS MAKING 40 TO 65 GAL. OF LIGHT OIL PER HOUR

The gas carrying the vapors of "light oil" made up of olefines, benzol, toluol, solvent naphtha and heavy naphtha, is brought into contact, in a scrubber located at the inlet to, or outlet from the purifying house, with an oil having absorptive properties for these vapors. These light oils are thus removed from the gas and carried out of the gas train by the benzolized wash oil flowing from the bottom of the scrubber and are collected in a suitable tank called a benzolized wash oil tank.*

The benzolized wash oil is pumped continuously, first through a heat exchanger where it absorbs the heat from the hot debenzolized oil flowing from the bottom of the still, and then through a steam preheater where it is raised to a temperature of about 120 deg. C, into a rectifying or dephlegmating column made up of sections of bell washers piled one on top of the other, the hot oil entering about half way up the column. In the bottom of the debenzolizing or stripping still is a chamber into which live steam is admitted to the body of the wash oil. A steam coil is also placed on the bottom of this chamber.

At the top of the column is a water cooled condenser or planer.

When the hot benzolized oil is pumped into the column, the lower boiling portions of the light oil are vaporized and pass upward through the column. The wash oil, carrying the unvaporized light oil, flows downward through the column to the bottom chamber, where it meets with the heat from the steam coil and where live steam is introduced directly into the body of the oil. Under the law of partial pressures, if live steam is admitted to the hot oil at the bottom of the column, the temperature at which the light oil will be driven off is reduced. For instance, the xylol, which is the main constituent of solvent naphtha and which boils at a temperature of 141 deg. C., will, when live steam is admitted, boil at a temperature of 91.5 deg. C. By this means the remainder of the light oil is driven off and upwards through the column. The vapors in their passage up through each of the bell washers will be absorbed by the liquid contained therein. Some of the

*NOTE—The wash oils now in use are so-called straw oil, sold through oil refining companies, and oils having a specific gravity of about 1.04 obtained from the distillation of coal tar or water gas tar and sold by the tar distilling companies. They must have the property of not starting to boil below 200 deg. C., at which temperature all of the light oil will have been boiled off.

The temperature at which the gas should reach the scrubber is about 85 deg. Fahr., and it is desirable that the scrubber should be jacketed with insulating material and that the wash oil entering the scrubber should be slightly higher than the temperature of the gas. This is to prevent condensation of water in the scrubber, which may cause considerable trouble by emulsifying the benzolized wash oil and which would add difficulty to the operation of separating the light oil from the wash oil in the rectifying column.

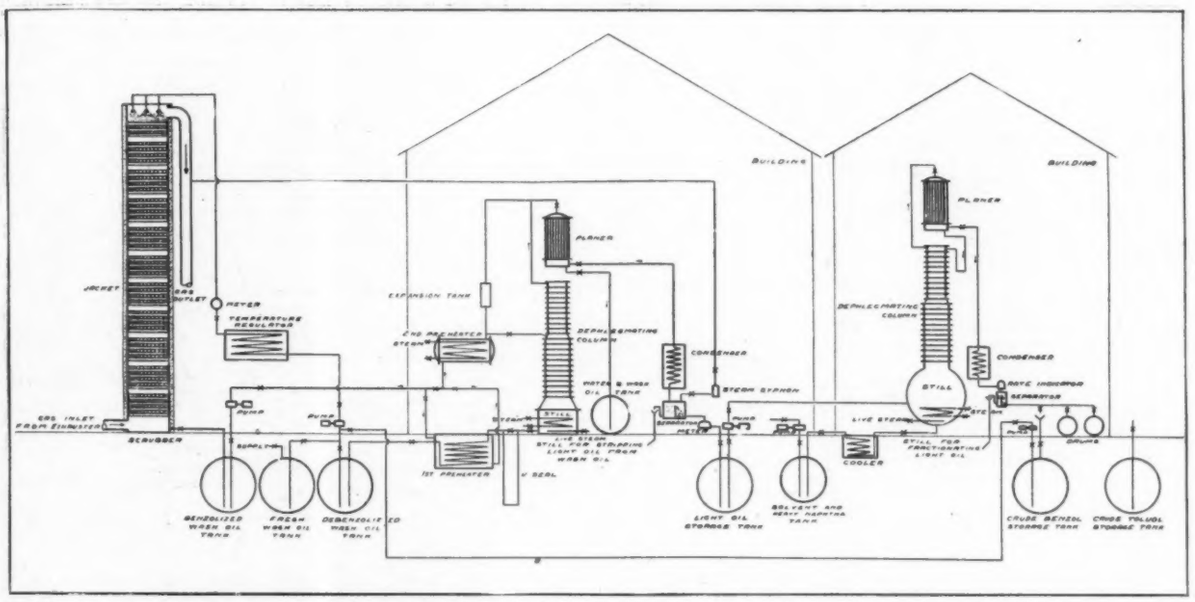

PLATE 1. DIAGRAM OF PLANT FOR SCRUBBING LIGHT OILS AND FOR FRACTIONATING THE LIGHT OILS INTO BENZOL, TOLUOL AND SOLVENT NAPHTHA, FOR PLANTS MAKING FROM 40 TO 65 GAL. OF LIGHT OIL PER HOUR

vapors will become fluid and give up their heat to this body of liquid. This will cause vaporization of the lighter portions of the liquid which will pass on up to the next bell washer, and so on until the top is reached.

The planer at the top will have its temperature set so as to permit the light oil to go forward as a vapor, but will condense any water, wash oil or heavier materials which will flow as a liquid from the planer through a worm condenser, thence to a storage tank. Here it may be collected, the water drawn off and the material pumped again with the benzolized oil from the scrubber to the column; or, after the water is drawn off, if this material should prove too heavy for the column it can be pumped into the light oil, to be sent through the light oil still. This will depend upon the quality of the wash oil.

This is a continuous operation and the efficiency of the wash oil for further absorbing light in the gas scrubber will depend upon the degree of operation of the light oil from the wash oil. If the wash oil is sent back to the scrubber without a thorough separation of the light oil, its efficiency for the absorption of the benzol vapors from the gas will be reduced. The efficiency of this separation in the column and planer will depend upon, first, the temperature at which the oil is admitted to the column, which should not be allowed in any event to go below 105 deg. C. and which should preferably be above than below 120 deg. C., and second, on the design of the column and planer.

The debenzolized wash oil flows continuously from the bottom of the still and is cooled in the heat exchanger referred to above. It then passes to the debenzolized wash oil storage tank, from where it is pumped again through the scrubbers.

The condensate in the planer, made up of water, light oil and some of the wash oil, is not allowed to flow back into the column, as is usual with rectifying columns of this kind, because of the presence of water which would interfere considerably with the rectifying operation.*

The result up to this point is the separation and collection in liquid form of the light oils from the wash oil, and the returning of the debenzolized wash oil to the gas scrubbers.

Whether in works sending out less than an average of 750,000 cu. ft. of gas per day it will be best to stop the toluol recovery process at this point and sell the light oil so separated to the benzol and toluol refining companies for refining into pure toluol and pure benzol, or for the gas company to continue to the next stage of separating the crude benzol fraction from the crude toluol fraction, sending only the toluol fraction to be refined, will depend upon:

First. The need for conserving the candle power by restoring the benzol fraction, and especially the olefines contained therein, to the gas.

The first step of the refining operation is to destroy these olefines by sulphonation with sulphuric acid. Water gas will have as much as 15 per cent of the light oil as olefines, and coal gas as much as 6 per cent. The entire benzol fraction will be about 40 per cent of the light oil and will have a candle power enriching value of about 20 candles per M. per gallon of benzol fraction.

Second. The need for reserving the refining capacity of the country for production of pure toluol instead of pure benzol.

Third. The need for minimizing the railroad transportation. If only the crude toluol fraction is shipped, the volume transported will not be over 25 per cent of that of the light oil.

As against the above:

Fourth. The toluol remaining in the benzol and naphtha fractions, amounting sometimes to as high as 10 per cent of the total toluol, will be lost to the pure toluol production.

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* NOTE—In large plants it will be found of value to run a vapor line from the outlet of the worm condenser back to the gas outlet from the scrubber. There will be found sufficient uncondensable olefines existing in a vaporous form to be worth saving. This can be done with a fan or a small steam syphon.

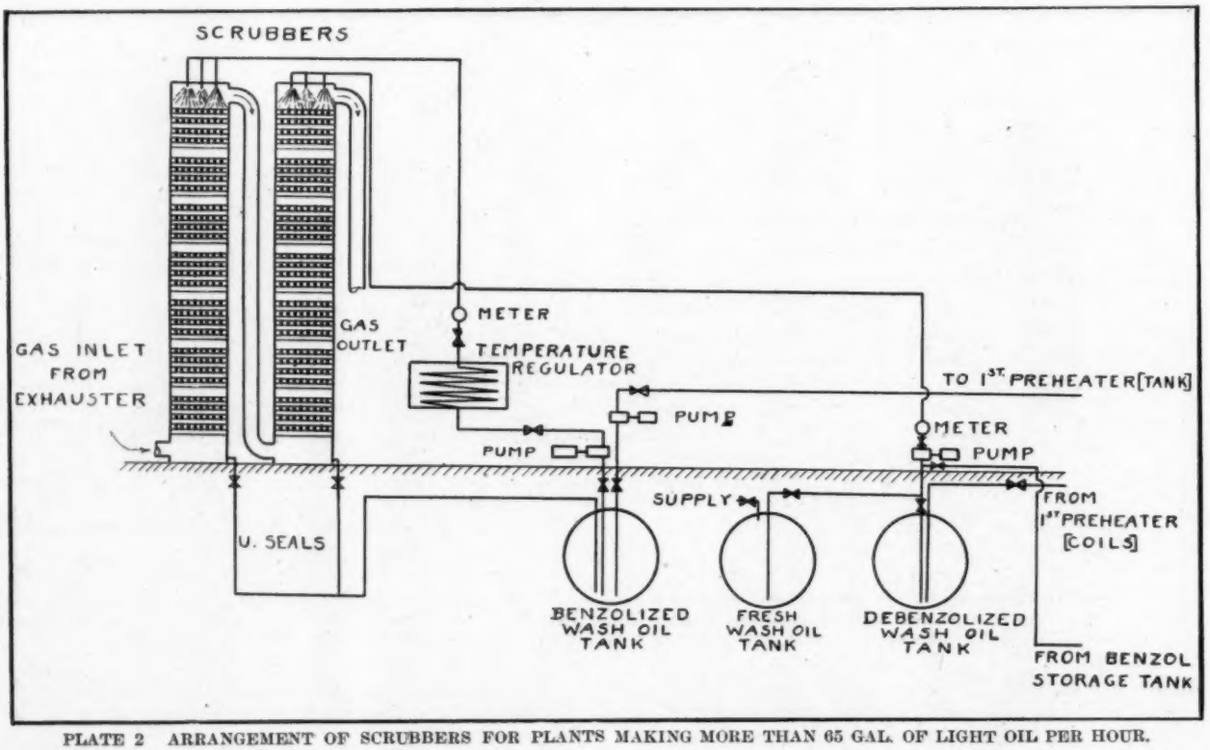


PLATE 2 ARRANGEMENT OF SCRUBBERS FOR PLANTS MAKING MORE THAN 65 GAL. OF LIGHT OIL PER HOUR.

Fifth. It may be found eventually that a great increase in the quantity of pure benzol produced will be needed if the total production of pure toluol proves insufficient.

Sixth. The reduced cost and time and area required for installation of plant.

The third stage of the recovery process is the separation of the light oil into the benzol fraction, the toluol fraction, and the solvent and heavy naphtha fractions.

This consists of a still on which a dephlegmating column is superimposed, and above the column is a water cooled planer or condenser. The still is again heated by steam contained in steam coils, and also steam is admitted directly into the body of the oil. This is an intermittent operation.

After the still is filled, the indirect steam is turned on and the temperature at the vapor outlet of the planer at the top of the column is carried so that the benzol fraction is boiled from the light oil and passes out as a vapor from the planer.

The temperature of the planer is then allowed to increase and the toluol fraction is driven off, during the latter part of which period, unless steam of unusually high pressure is available, live steam is also introduced into the body of the oil.

If it is desired to separate the solvent naphtha from the heavy naphtha left in the still, and small quantities of wash oil carried over, live steam is continually admitted into the body of the oil through a perforated pipe running along the bottom of the still. By this means the solvent naphtha will be driven off rapidly. The residue may be returned to the debenzolized oil tank.

The different fractions are condensed in a worm condenser, any remaining water is removed by the separator, and the benzol is run into the crude benzol storage tank, the crude toluol into the crude toluol storage tank, and the solvent and heavy naphthas are collected either in one or two tanks as desired.

The benzol fraction thus obtained will contain about 85 per cent of pure benzol and olefines, the balance being some toluol and solvent naphtha.

The toluol fraction will contain from 60 to 80 per cent of toluol, the balance being a little benzol, olefines and solvent naphtha.

The benzol fraction can then be pumped back into the gas for enrichment, or can be carried on to the fourth stage where the refining of these oils begins. If used for enrichment, it should be examined to see if the sulphur content will stain the acetate of lead paper used in testing gas, if the benzol is introduced beyond the purifier outlet. It may be necessary to introduce it into the gas at the purifier inlet.

These oils are now a light yellow in color.

In water gas the total amount of toluol will be very close to 2 per cent of the gas oil used. If the entire light oil is sent to a refining plant and that refining plant has an efficiency of 90 per cent in toluol recovery, we might expect to get 1.8 per cent of the gas oil used as salable pure toluol. If the benzol fraction is replaced in the gas and only the toluol fraction is sent to the refinery, there will be a loss of total toluol due to that contained in the benzol fraction and in the naphtha fraction of as much in practice as 10 per cent, so that the toluol sent to the refinery will amount to only 1.8 per cent of the gas oil used. Assuming now an efficiency of 90 per cent in the refining plant, the amount of pure toluol recovered for sale will be 1.6 per cent of the gas oil used.

The amount of toluol recovered from coal gas will be found to be about three hundredths of a gallon per 1,000 cu. ft.

The steam pressure, as shown by a gauge in the still

house, should not be allowed to get below 100 lb., and water should be supplied at a uniform pressure. The amount of steam required to strip the light oil from the wash oil is estimated at 1.3 hp. per gallon of light oil per hour.

Tank for Cumarone Jelly and Naphthalene

There is extracted with the oils from the gas a jelly-like material which will remain with the wash oil and which, if not removed, will cause the oil to become so heavy as to make it unfit for use. It is advisable to provide an open tank, water cooled, into which a certain portion of the wash oil can be placed each day to allow this jelly and naphthalene to settle out. The clear oil can be drawn from the top and returned to the debenzolized oil tank—the jelly being scraped out and discarded.

like poor practice to allow the wash oil to pass back into the same tank from which it was pumped to the scrubber, but in practice it will be found to work. The wash oil coming from the gas inlet scrubber will be found to be not entirely saturated with the light oils and the flow of benzolized wash oil from the gas inlet scrubber will continue to freshen the wash oil for admission to the gas inlet scrubber. If desired, in the larger of these plants the tank for receiving the benzolized wash oil from the gas outlet scrubber might be made separate from that of the gas inlet scrubber.

Apparatus for Plants Making from 15 to 40 Gal. of Light Oil per Hour

The maximum amount of light oil produced will probably be not over five-tenths of a gallon per 1,000 cu. ft. of gas. In a plant of 75,000 cu. ft. per hour this would

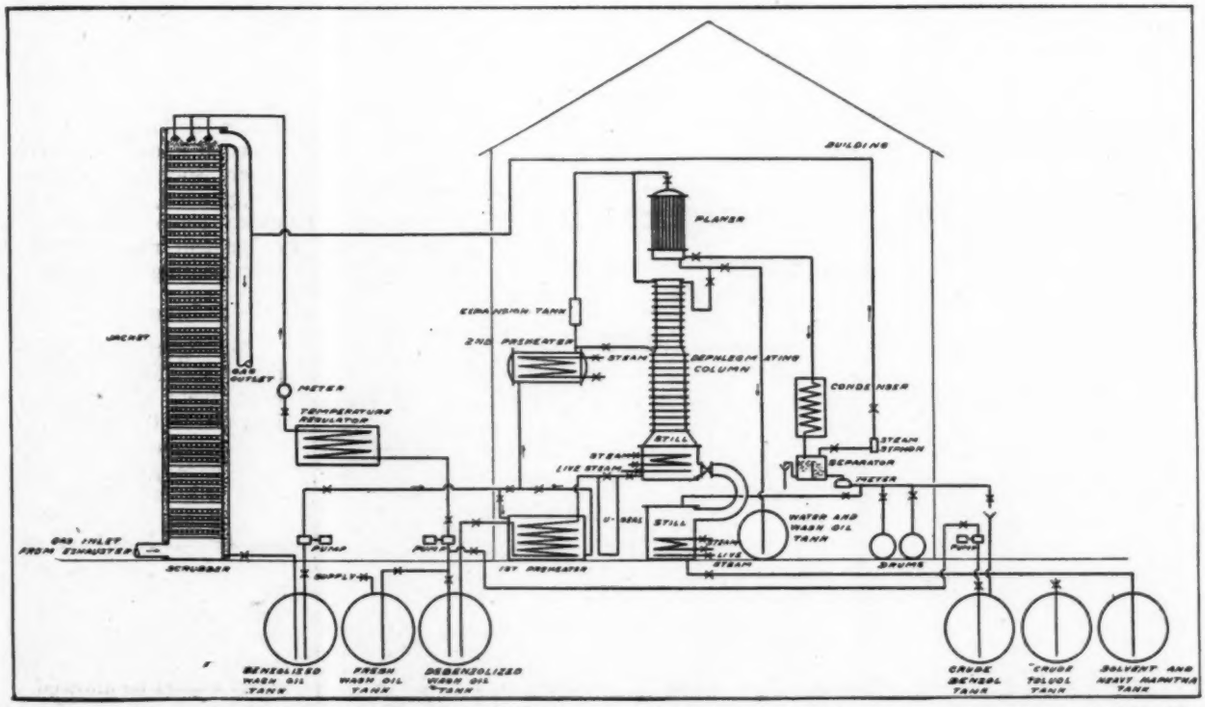


PLATE 3. PLANT FOR SCRUBBING LIGHT OILS AND FOR FRACTIONATING THE LIGHT OILS INTO BENZOL, TOLUOL AND SOLVENT NAPHTHA FOR PLANTS MAKING FROM 15 TO 40 GAL. OF LIGHT OIL PER HOUR

There should be two scrubbers in tandem for plants producing more than 65 gal. of light oil per hour.

Estimating on a basis of total scrubber capacity of 30 cu. ft. per 1,000 ft. of gas per hour, it is advisable to use two scrubbers since in many cases there would otherwise be too great a weight per square foot of foundation, without unusual expense. It is even advisable, for efficiency in scrubbing, to have two scrubbers for smaller plants, although not entirely necessary.

Plate II shows a suggested method of introducing the scrubbing oil in tandem scrubbers. Assuming the oil from the debenzolized wash oil tank in the larger plants to be continuously in circulation, the oil from the gas outlet scrubber is allowed to flow into the benzolized wash oil tank. It is pumped from there through a preheater into the gas inlet scrubber and the benzolized oil from this scrubber flows back into the same tank from which it was pumped. In theory this looks

amount to 37½ gal. of light oil per hour, or 900 gal. per day. Estimating the amount of wash oil introduced into the scrubber per 1,000 ft. of gas at 15 gal. the total amount of wash oil per day would be $75 \times 15 \times 24 = 27{,}000$ gal.

By increasing the size of the debenzolized wash oil tank, the benzolized oil tank and the column so that the entire amount of benzolized oil that comes from the scrubber in 24 hours can be distilled through the column in 16 hours, it will permit the same column to be used for at least 6 hours each day for fractionating the light oil, thereby saving the expense of installation of another column and necessary building, less the cost of extra size of tank and column.

The debenzolized wash oil tank must hold at the time that the column is changed from the stripping to the fractionating process enough wash oil to permit the scrubbing of the gas to go on continuously during the

time that the column is used for fractionating; that is, $75 \times 15 \times 8 = 9{,}000$ gal. of wash oil; and the benzolized oil tank must hold a similar amount since nothing can be pumped from it into the column during the eight-hour period. Allowing 1,000 gal. extra, it would make these two tanks have a capacity of 10,000 gal. each.

The procedure is shown in Plate III and is the same as Plate I up to the outlet of the stripping column. In this case the vapors of the light oil pass through the planer into the condenser, then through the water separator and then into the still base that is to be used for fractionating the light oil. The condensate from the planer is treated as before.

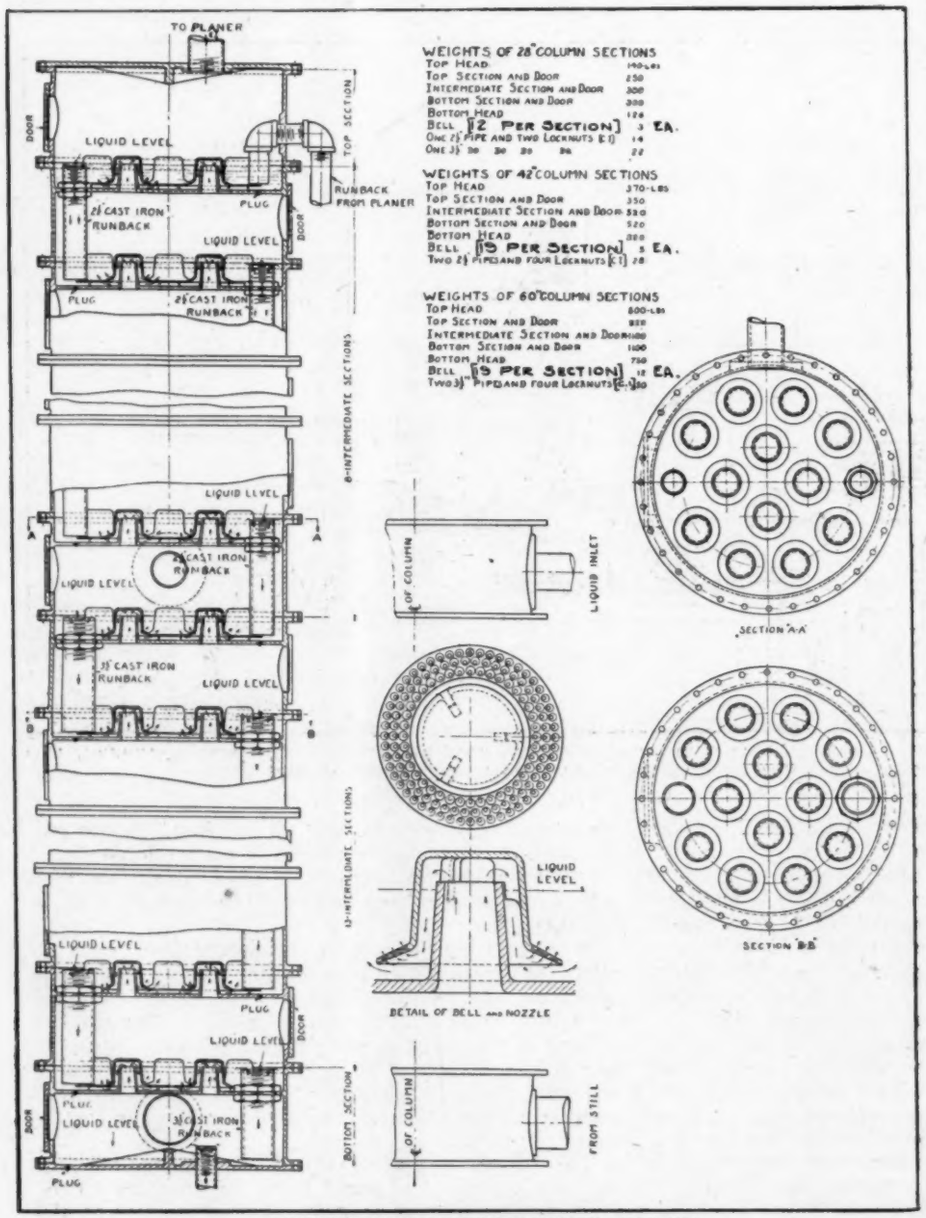
The base of the column is also connected to the light oil receiver, to be used as a still base.

On the pipe leading from the water separator to the light oil still base an outlet, both runs being suitably valved, leads to a header to the crude toluol and crude benzol tanks.

Also the pipe leading to the light oil still base is valved off and the benzol and toluol condensates from the condenser will then pass through to their proper tanks.

The selection of 15 gal. of light oil per hour as a minimum production for which this apparatus is recommended is purely an arbitrary figure, the thought being that in some works making less than 15 gal. of light oil per hour and other making more than 15 gal. of light oil per hour, the location with respect to some other plant might be such as would justify them in sending their light oil to be distilled at a larger plant and doubling up with some other gas works fairly close in the fractionating operation.

The amount of light oil that would be produced in a plant making 1,000,000 cu. ft. of gas per day will not be over 500 gal. and this could be shipped in 100-gal. drums at the rate of about one carload in 10 days. Larger plants located within short distances of each other, such as in New England, might well make some mutual arrangement regarding the fractionating operation.


TO PLANER
WEIGHTS OF 28" COLUMN SECTIONS
TOP HEAD 140-LBS
TOP SECTION AND DOOR 250
INTERMEDIATE SECTION AND DOOR 300
BOTTOM SECTION AND DOOR 300
BOTTOM HEAD 126
BELL [12 PER SECTION] 3 EA.
ONE 2½ PIPE AND TWO LOCKNUTS (C.I.) 14
ONE 3½ " " " " 22
WEIGHTS OF 42" COLUMN SECTIONS
TOP HEAD 370-LBS
TOP SECTION AND DOOR 350
INTERMEDIATE SECTION AND DOOR 520
BOTTOM SECTION AND DOOR 520
BOTTOM HEAD 320
BELL [15 PER SECTION] 5 EA.
TWO 2½ PIPE AND FOUR LOCKNUTS (C.I.) 28
WEIGHTS OF 60" COLUMN SECTIONS
TOP HEAD 800-LBS
TOP SECTION AND DOOR 820
INTERMEDIATE SECTION AND DOOR 1100
BOTTOM SECTION AND DOOR 1100
BOTTOM HEAD 750
BELL [15 PER SECTION] 12 EA.
TWO 3½ " AND FOUR LOCKNUTS (C.I.) 30
LIQUID LEVEL
PLUG
RUNBACK FROM PLANER
TOP SECTION
DOOR
2½" CAST IRON RUNBACK
3½" CAST IRON RUNBACK
8-INTERMEDIATE SECTIONS
12-INTERMEDIATE SECTIONS
BOTTOM SECTION
OF COLUMN
LIQUID INLET
FROM STILL
SECTION A-A
SECTION B-B
DETAIL OF BELL AND NOZZLE

CROSS-SECTION OF DEPHLEGMATING COLUMN

Lighting

The lighting of these plants should be confined exclusively to electric incandescent lights in double vapor-proof bulbs with wire guards. The light oil is volatile at all ordinary temperatures and several fires have resulted from flashes, such as the breaking of single bulb incandescent lamps, that have caused serious damage. No extension cords should be allowed.

While it now appears unlikely that any of the gas companies will be called upon to refine the toluol fraction, a brief description of the method follows. We believe that there is a difference in the treatment of the light oil recovered from water gas and that recovered from coal gas.

Washing the Toluol Fraction

This consists of treating the toluol fraction with sulphuric acid for the purpose of separating the olefines from the oils of the benzene series.

This work is done in an agitator or washer, which consists of a lead-lined casting having a capacity of from 100 to 5,000 gal. It is equipped with apparatus for agitating or stirring the oil in order to get a thorough mixture. Sulphuric acid of about 66 deg. Baume is added in small quantities, stirred, allowed to settle and the sulphonated olefines are then drawn off from the excess acid from the bottom. More acid is added, again stirred, and again the residue is drawn off. This operation is carried on for four or five times. The olefines are each time converted into an acid sludge that looks like tar. Too much acid added at one time, or too lengthy agitation will be indicated by a lumpy condition of the tar. The time required for this treatment is about six hours. For water gas, the amount of acid used is about eight-tenths of a pound per gallon of crude toluol fraction introduced.

After the olefines have been removed (which can be determined by taking a sample to the laboratory and treating with additional acid), a solution of caustic soda is added to neutralize the remaining acid. The material is then left to stand quiescent in the agitator until all of the caustic soda solution, some of which will have been converted into sodium sulphate, settles to the bottom. This is then drawn off.*

For Toluol Recovery from Water Gas

The washed toluol fraction is then pumped into a straight steam still fitted with a nest of steam coils in the body of the oil through which the heat is transmitted to the oil. The still has no column but the vapors from the still pass directly through the condenser, coming out in liquid form and this liquid passes upwards through a tank containing a solution of caustic soda. It flows from the top of the soda washer into the refined toluol tank.†

The toluol is now ready for the fifth stage, which consists of passing it through a refining still.

This is an indirect steam heated still of from 1,500 to 10,000 gal. capacity, on which is superimposed a proportionate column of some thirty-two sections. The planer at the top is fitted with thermostats so that the temperature can be carefully controlled and the distillation carefully watched.

The material in the still is now made up of some benzol, a large percentage of toluol and some solvent naphtha. When the fraction in the still starts to vaporize, the temperature in the planer is so adjusted as to allow only the pure benzol to go forward as a vapor and condensing any toluol or solvent naphtha that may have worked up through the column, which condensed toluol or solvent naphtha will then drop back into the column again.

The first runnings of the still will be pure benzol. The very first runnings may not come quite within the specifications for pure benzol, being somewhat too light.

After the pure benzol has come off, the still runnings will decrease in rate. The temperature in the planer is then increased and the material in the still will rise in temperature until the boiling point of toluol is reached, when a period will ensue during which the liquid in the column will be gradually increasing in its toluol strength and decreasing in its benzol strength, and the material flowing from the condenser will be an intermediate fraction consisting of benzol and toluol, which must be drawn into drums and returned to the still for redistillation in the next or later charges. Then the pure toluol will begin to come off. After the toluol is finished, the residue in the still will consist of refined solvent naphtha. The production of pure toluol, therefore, will always be accompanied by the production of small amounts of pure benzol and refined solvent naphtha.

During the operation there will be a disappearance of toluol and it will be necessary to follow up each stage with sufficient laboratory equipment to intelligently conduct the distillation.

There will be required in the operation of these plants a sufficient knowledge of chemistry and chemical equipment in the laboratory to check up each stage of the process.

We call attention to the paper entitled "The Analysis of Small Quantities of Light Oil," by Frederick W. Sperr, Jr., and A. Allison Kohr, of the H. Koppers Company, published in the August, 1917, issue of the "Gas Institute News," page 373.

The process just described is one that has been in operation for several years and represents a good, workable installation. It is not claimed that this is the best in all details. Specialists in the installation of toluol recovery plants will doubtless have their own solution of various details.

This committee holds itself ready to give further information and go promptly into all details that may be asked for.

Chemical Control of Recovery Plants

It may not be out of place here to speak briefly of the chemical characteristics of the hydrocarbons in the gas and of the chemical or rather physical testings that is necessary to control the operation of a recovery and fractionating plant.

The important hydrocarbons are what is known as the benzene homologues, some olefines or unsaturated hydrocarbons, and small quantities of carbon bisulphide, thiephene and several others of lower boiling point are present as impurities.

Of the benzene homologues we have benzene toluene and a mixture of xylene and some higher boiling members known commercially as solvent naphtha.

These are colorless and rather sweet smelling liquids (when pure) with a rather high refractive index as an evidence of their ring structure.

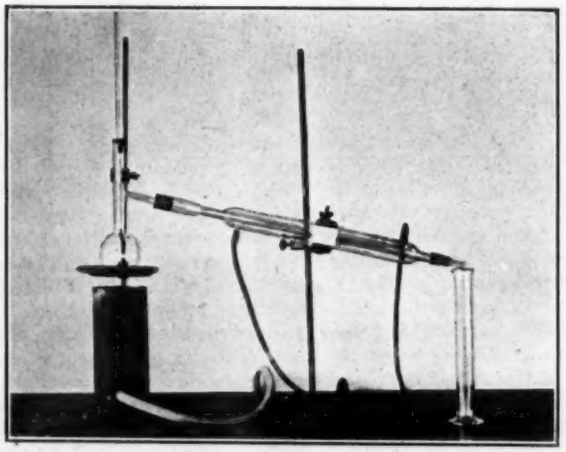
---

*Note: The toluol can also be destroyed by treatment with highly concentrated sulphuric acid and it is desired to use the sulphuric acid in such strength and such quantities as will completely eradicate the olefines and leave unharmed the toluol.

† Note: Investigation seems to prove that in the treatment by sulphuric acid in the washer of the olefines contained in the toluol fraction, that there are some sulphonated olefines remaining in suspension in the oil that will not be precipitated or be affected by the caustic soda, but travel with the washed commercial toluol. As soon as this material is heated in the still, these sulphonated olefines are again decomposed with the evolution of sulphuric acid, which attacks the still and particularly the planer and condenser.

Therefore, we recommend for smooth operation of the refining plant where water gas toluol is being refined, that a still as above described be used and that the connections to the worm coil, the coil and the outlet of the soda washer be made of lead.

For the refining of toluol from coal gas this does not appear to be needed.



APPARATUS USED IN DISTILLATION TEST TO DETERMINE VALUE OF HYDROCARBONS

Some of their physical characteristics are given in the following table:

Name	Chemical Formula	Boiling Point at 760mm = 29.92" Bar.	Melting Point	Sp. Gravity at 15½°C = 60°F.
Benzene	C_6H_6	80.4°C = 176.7°F	+ 5.4°C = + 9.7°F	.8840
Toluene	$C_6H_5.CH_3$	110.4°C = 230.7°F	— 92.4°C = — 134.3°F	.8714
M. Xylene	$C_6H_4.(CH_3)_2$	139.2°C = 282.6°F	= 54.8°C = — 57.6°F	.8697

The commercial products are known under a variety of names as for instance the purest products are known as "C.P." or "Pure" are usually expected to boil or distill within 2 deg. C = 3.6 deg. Fahr. and have for benzene a specific gravity at 15½ deg. C of 0.883 to 0.885 and to be free of olefines and contains only traces of sulphur compounds; and for toluene to have a gravity of 0.869 to 0.871 be free from olefines and contain not over ½ per cent of paraffin hydrocarbons.

There are a number of commercial grades of benzene known as 100 per cent, 90 per cent, 50 per cent etc.; this does not mean that the article contains 100—90—50 per cent of pure benzene but that the percentage by volume indicated will distill over under certain conditions at 100 deg. C = 212 deg. Fahr.

Since these hydrocarbons are valued almost exclusively by the distillation test it will be briefly described, although the Gas Chemists Handbook, pages 180-187, gives a complete description.

The apparatus used is shown in the accompanying illustration.

One hundred cubic centimeters of the fraction to be examined are placed in the Engler flask of specified dimensions supported on a piece of asbestos board having a 1½-in. circular hole in the center.

The flask is connected with a glass condenser and a thermometer graduated to 1/5 deg. or 1/10 deg. C is inserted in the neck of the flask.

The heating is done with a bunsen burner and is carried at such a point that the distillate from the end of the condenser can just be counted as distinct drops, not a continuous stream. The distillate is caught in a graduated cylinder.

When the first drop of distillate leaves the end of the condenser tube the temperature of the thermometer is noted as is given as 1st drop. When the last drop of liquid leaves the bottom of the flask the temperature is noted as the dry point.

In distilling benzene toluene, etc. it is necessary to observe the barometer and correct the thermometer readings accordingly as an increase of 1" or 25.4 mm in barometric pressure would increase the boiling point of benzene 1.09 deg. C or 1.97 deg. Fahr. and for toluene 1.19 deg. C or 2.15 deg. Fahr. and vice versa.

In determining specific gravity the temperature must be observed within 0.1 deg. C in order to obtain accurate results.

It will be evident that the operation of a toluene recovery plant will require in addition to the mechanical engineering features a certain amount of chemical control. This will naturally vary with the size of the plant. Many of our larger gas plants already have a chemist who can readily pick up the technic of this work, but the amount of the work involved in a large plant of, say, four to five millions per day will keep two men busy, while in the smaller plants the work can be cut down so that a bright high school boy can be taught in a few months to make the control tests essential for operation.

The tests will naturally divide themselves into:

(a) The determination of the hydrocarbon vapors present in the unscrubbed gas and those remaining in gas after scrubbing. This will give directly the efficiency of the plant.

(b) The determination of the percentage of hydrocarbons or light oils in the benzolized and debenzolized wash oils, this regulates the amount of wash oil used and the operation of the debenzolizing apparatus.

(c) The valuation of the light oil and the fractions made from the fractionating still for their content of benzene, toluene, etc., this determines the yield from the plant and regulates the operation of the fractionating still.

(d) In the larger plants there are many other subjects for control, viz.: the quantity of the wash oil, the presence of paraffin in the light oil, the amount of olefines and other impurities, relation of temperature in various parts of the plant to efficiencies, etc., etc.

Detailed descriptions of the methods used are given in the Gas Chemists' Handbook, Gas Institute News, 1917, *London Journal of Gas Lighting*, etc., and will not be repeated here, but the tests will be outlined.

In determining the hydrocarbon vapors in the gas a sample is passed slowly through either a train of some ten wash bottles containing straw oil or oleic acid, or through a smaller tower, and the light oil absorbed is recovered by distilling with steam. After washing with acid and soda solution to remove olefines the light oil is dephlegmated to remove traces of wash oil and the distillate is calculated to gallons per ton of coal carbonized or as a percentage of the gas oil used.

In the control of the benzolized and debenzolized wash oil a large average sample is steam distilled and is washed and dephlegmated as above. In the case of the debenzolized wash oil any light oil recovered is distilled to determine whether any toluene has escaped recovery.

Practically every large interest has developed its own special method for the valuation of the light oil and fractions. A number of these methods have been described in the literature before quoted. In general, after the washing with acid and alkali and dephlegmation the distillate is repeatedly dephlegmated into certain empirical fractions and these are further examined by

distillation in an Engler flask as before described or the gravity is determined, etc., and by reference to tables and curves made up from known mixtures of pure materials quite satisfactory valuations can be made.

Paraffin hydrocarbons are detected by abnormally low gravities of the pure fractions and may be determined by nitrating samples and determining the residue or by the use of very strong sulphuric acid and centrifuging the resulting mixture of sulphonic and sulphuric acids, when the unacted on paraffin will rise to the top of the container.

For the smaller plants a simple distillation of the light oil and fractions with frequent examination of the debenzolized wash oil will furnish the essential data for operation.

A typical set of determinations would be as follows:

Light Oils in unscrubbed water gas.....0.389 gal. per M. or 9.73 per cent of gas oil used.

Light Oils in scrubbed gas.....0.048 gal. per M. or 1.20 per cent of gas oil used = 88 per cent Recovery.

Light Oil in benzolized wash oil 3.15 per cent by Volume.

Light Oil in debenzolized oil 0.30 per cent by Volume.

First Drop on recovered oil was 138 deg. C, indicating little if any toluene.

Light Oil Distillation Test.				Valuation.
Temperature 71 deg.	C.	1st drop		
80	" "	1	"	Benzene 30.8 per cent.
85	" "	2	"	
90	" "	4	"	Toluene 19.0 per cent.
95	" "	13	"	
100	" "	18	"	Sol. Naphtha 6.2 per cent.
105	" "	33	"	
110	" "	41	"	Residue 11.0 per cent.
115	" "	47	"	
120	" "	52	"	
125	" "	55	"	
130	" "	59	"	
135	" "	62	"	
140	" "	64	"	
150	" "	68	"	
170	" "	75	"	
200	" "	86	"	
244	" "	Dry Point.		

Still Fractions

	First Receiver	Benzene Fraction	Intermediate Fraction	Toluene Fraction	Intermediate Fraction	Sol. Fraction
First Drop	60°C.	76°C.	93°C.	104°	109°	130°
70	2%					
75	13					
80	80	54				
85	95	98				
90						
95			1			
100			9			
105			50			
110			94	48		
115			92	1		
120			96	5		
125			22			
130			55			
135			79			5
140			95			15
150						65
160						91
Dry Point	90°	87°	112°	124°	148°	180°

Details of Parts of Scrubbing and Fractionating Plant

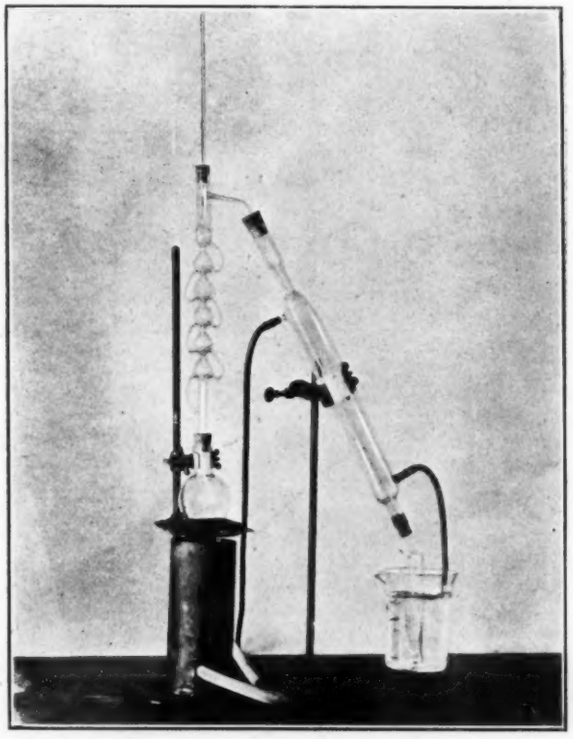
Gas scrubbers should be filled with trays of the ordinary pattern. They should be designed to have a shell volume of 30 cu. ft. per M. per hour, during periods of maximum make.

For capacities of more than 125 M. per hour, there should be preferably two scrubbers in tandem, each not less than 45 ft. in height.

Since in water gas the quantity of light oil recoverable is proportionate to the amount of gas oil used, and not to the quantity of gas scrubbed, the figures given in the following tables of details of sizes are in units of gallons of light oil recovered per hour.

The light oil from water gas is estimated at 10 per cent of the gas oil used per hour, and for coal gas at 3.5 gal. of light oil per net ton of coal carbonized.

The temperature of the gas entering the scrubbers



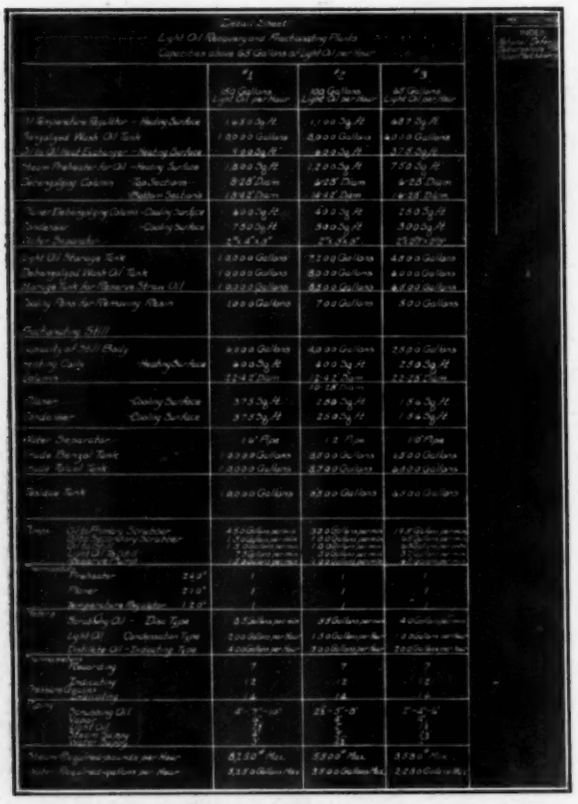
APPARATUS FOR DEPHLEGMATION

should not be over 95 deg. Fahr. The necessity of preliminary gas coolers will therefore depend on local conditions.

It has been found by the committee that it is probable that the present refining plants will be sufficient to take care of the extra production, and we have dealt in the previous items on the advisability of installing a still for fractionating the crude toluol.

Type of Gas Oil or Fuel

This cannot be even guessed at. Gas companies are now glad to get anything; generally no two tank car loads are alike. If it is found that serious attention must be given to this because of high paraffins, the matter will have to be gone into very thoroughly and the gas companies aided in buying oil suitable for toluol production.



DETAIL SHEET FOR LIGHT OIL RECOVERY AND FRACTIONATING PLANTS—CAPACITIES ABOVE 65 GAL. PER HOUR

Generally speaking, there seem to be no pieces of second hand apparatus in sight except in a few of the largest gas works. We assume that the desirability of adopting some specific design of recovery plant for these gas works would make second-hand apparatus objectionable.

Loss of Candle Power and Heating Value

Water Gas:	candles
For every gallon of oil used there may be extracted one-tenth of a gallon of light oil.	
The illuminating value given to one thousand feet of gas by one gallon of gas oil will average approximately...	5.75
The illuminating value lost by the extraction of one-tenth of a gallon of light oil is.....	2.86
Remaining candle power after extraction of light oil.....	2.89
If the crude benzol fraction containing olefines is returned to the gas, the candle power restored will be....	.91
Candle power of gas sent out.....	3.80
Or 66 per cent of the original candle power.	

The average oil used per M. by the gas companies from which we propose to recover toluol is 3.8 gal.

Estimating as herein shown a loss of 1.95 candles per gallon, the average loss in candle power will be 7.4 candles.

Similarly, the average loss in heating value will be about 27 B.t.u., or a loss of about 5 per cent of its heating value.

With the exception of some of the larger gas companies operating on a high candle-power basis, it would be physically possible to restore the gas to the present established standard of quality by the use of more gas oil per M. To restore the 27 B.t.u. per M. it would be necessary to add not less than 0.26 of a gal of oil per M.

The gas companies under consideration will make in 1918 approximately 110,000,000 M. cu. ft. of water gas, which, requiring 0.26 of a gallon of gas oil additional per M., per year will aggregate 28,600,000 gal. It is probable that this will not be available and the gas companies will not be able to restore this gas to its present quality.

It is evident that it would be impossible to restore the high illuminating value of some of the larger plants.

(d) Monthly Production January to December Inclusive

The percentage of yearly production that will be recovered each month will be about as follows:

January	9.3 per cent
February	8.7 per cent
March	8.6 per cent
April	7.4 per cent
May	7.8 per cent
June	7.7 per cent
July	7.0 per cent
August	7.0 per cent
September	8.1 per cent
October	9.2 per cent
November	9.0 per cent
December	10.2 per cent

Willingness to Scrub

Every one of the gas companies enumerated has some standard of quality of gas which they are required to maintain and failing which subjects them to penalties involving fines, loss of reputation and good-will of the community served and may extend to the impairment of their capital invested in the business. Public service corporations are peculiarly exposed to quick and general publicity if it is believed that they are negligent or have not used all possible means to comply with their contract or charter obligations or regulations fixed, after conference, by the Public Service Commissions having regulatory power over them.

It will be necessary, therefore, that there be set forth the new conditions under which the gas companies will operate their plants. They must have an opportunity of studying what effect any new requirements will have upon their obligations to their consumers and to their ability to continue in the proper conduct of supplying the community with gas. Among these may be enumerated:

(a) By whom the installation of the recovery plants will be financed.

(b) By whom the recovery plants will be operated, with a view to preventing any irregularity in the operation of the toluol recovery plants interfering with the regularity of supply of gas to the consumer.

(c) If the gas companies operate the recovery plants, at what price is the toluol to be sold? The selling price of toluol should at least cover the cost of operation, which will undoubtedly be higher in some of the larger companies, and which may also be higher if the candle power or heating value is to be restored wholly or in part; the shrinkage of gas due to the loss of the volume of the vapors of light oil; the extra cost of manufacturing gas due to the proximity of a hazardous undertaking and the necessary overhead charges in the conduct of the business. In some cases there may be an extra charge for the rental of real estate, since it is to be assumed that some of the companies will not be able to house these plants in their present confined space and the erection of which in close proximity to other plants may not be permitted by their fire insurance regulations. Fire walls will add to cost of installation.

(d) The ability of the gas companies to cover the full scope of their business of supplying gas to their consumers along their lines of mains, and such extensions of mains as are covered by statutory requirements. If there is to be a reduction in the heating value sufficient to require more gas to supply the consumers' needs, that is, if the consumers must pay for more gas to get the same amount of work done (a question on which there is a very great difference of opinion), it may, with the other demands made upon the gas companies require them to meet a larger demand for gas than they can supply. Gas making materials are not only at unprecedented high prices, but every manager of gas companies is now spending much of his time in getting materials at any price.

Next to water, artificial gas is the most important and essential article entering into the domestic life of our cities. For years modern houses and apartments have been erected with no thought of anything but gas as a fuel for cooking, heating water and for local room heating. In a vast number of these homes nothing else can be used, no flues having been provided for coal stoves, and no storage for coal or ashes. In many cities it is not unusual to have from 85 per cent to 95 per cent of the homes dependent upon gas ranges for cooking. In many cities 80 per cent of all the homes depend exclusively upon gas for lighting. When there are abnormally high prices for domestic coal, or when there is a shortage of such coal, the consumer is accustomed to turning to gas and in many places during periods of unusually cold weather the demand for gas largely increases.

If to these are added an increased consumption due to the fact that some of the elements of heating and candlepower *put into the gas have been taken out and diverted to other uses,* the demand upon many of the gas works may be more than they can supply.

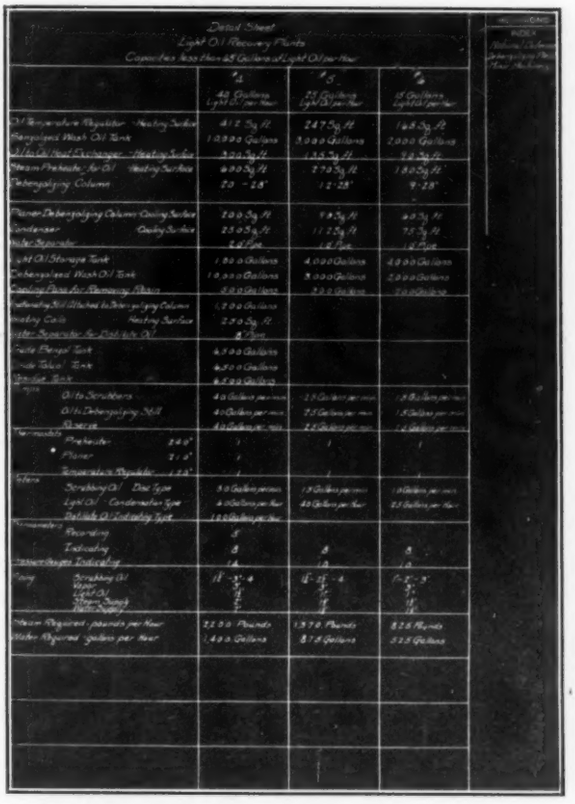
Therefore, during the period of toluol recovery the gas companies may have to go to the expense of comparatively large additional installations to their entire manufacturing plants. This is not a theory but a condition that the gas companies to-day have to meet. After a period (from 1912 to 1915) during which there was an exceedingly low rate of increase in the amount of gas sent out by gas companies, 1916 and 1917 have both been years of unusual increase in the demand for gas. The gas companies are looking with considerable apprehension to this coming year in view of all the conditions as stated above, which are in the direction of heavier burdens on the gas companies' output.

Therefore, the answer to the question regarding the willingness of gas men to respond to the need for toluol can be summed up in the statement that the managers of gas companies are now fully occupied in preparing themselves to meet the unusual demands of their business. They do not look upon the toluol recovery plants as a desirable investment or as a source of large profits, but if the Government will state with authority how the procedure is to be carried on, if at all, and it can be shown to them that they will receive a moderate profit to cover all costs of operation and depreciation, they will respond energetically and cheerfully to the call.

Is Scrubber Oil Available?

The amount of wash oil required for the first installation will be about 1,000,000 gal. This oil, if straw oil, should be of about the following specifications:

1. The gravity at 60 deg. Fahr. shall not be less than 34 deg. Baumé.



DETAIL SHEET FOR LIGHT OIL RECOVERY PLANTS OF LESS THAN 65 GAL. PER HOUR CAPACITY

2. The flash point, open cup shall be not less than 275 deg. Fahr.

3. The viscosity in Saybolt viscosimeter at 100 deg. Fahr. shall not be more than 70 seconds.

4. The pour test shall be not over 30 deg. Fahr.

5. When 500 cc. of the oil are distilled with steam at atmospheric pressure collecting 500 cc. of condensed water, not over 5 cc. of oil shall have to be distilled over.

6. The oil remaining from the steam distillation shall be poured into a 500 cc. cylinder and shall not show any permanent emulsion.

7. The oil shall not lose more than 10 per cent by

(Continued on page 358)

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The Report on Toluol Recovery

In the place of the leading article in this week's issue we publish the condensed report of the Sub-Committee on Coal Tar By-Products on the recovery of toluol from gas works, prepared by members of the American Gas Institute. This came to us after our schedule for the issue had already been arranged, and at the last minute, so as to speak, with the urgent request that, as a service to the Government, it be given publicity at the earliest possible moment. It is published in much the same manner that it came to us, with very little editing. There was no time available to make it conform to our style standards.

It is a source of satisfaction to us, however, to be able through our unique situation, being the only weekly journal in the field, to perform this service as requested.

There is no need to direct gas men's attention especially to the report. The information has been eagerly awaited throughout the industry and, doubtless, will be closely read.

Making Certain of Just Compensation in the Future

Much has been said pro and con about the compensation paid gas-company employees. Doubtless, much could be done to better general conditions along this line. The AMERICAN GAS ENGINEERING JOURNAL, however, is very much of the opinion that the compensation in the individual case, within limits, is very much within the control of the individual himself.

The man who has a sufficient sum laid aside to tide himself over, in the meantime has considerable to say as to the amount he is paid for his services. If he finds the company obdurate in accepting his valuation as to his worth, he is free to leave and seek a connection elsewhere. If he has not set an exaggerated value on his worth, he will not as a general thing, unless the management is steeped in stupidity, find it necessary to carry out his declared intention. The threat alone will bestir the company to activity. No gas company is so oversupplied with good men that it can afford to lose even one.

The man who is living from day to day, however, is denied this advantage. It is a case with him of taking what is offered or starve. He has nothing to carry him until the next job appears.

As a wage lever, therefore, alone, no salaried man should be without his rainy day fund. It is not as difficult to accumulate as one who has never subjected himself to compulsory saving might imagine. Most any man of reasonable earning power unless he is hampered by an unusual number of dependents should be able to save a tenth of what he makes. But when the saving is left to his own volition he is apt too often to consider luxuries essentials to make much headway.

Even if there was not a patriotic reason behind it this

journal would advise the salaried man to avail himself of the splendid opportunity afforded by the Liberty Bond issue to provide himself with this nest egg, this lever to just compensation in the future. Presupposing he is a very low salaried man let him start with a $100 bond. It will cost him, on the partial payment plan, $2 down and $2 a week until paid. The same ratio would prevail on larger amounts. It is a pretty low paid man who cannot save $2 a week. It is a wise man who, according to his present perspective, will pinch himself and make the weekly mite larger. The total will be so much greater at the end of the year.

Liberty bonds once one has obligated himself for a certain sum provide an ideal means of compulsory saving. Also a very desirable form of investment when once paid for. They are as convenient as a means of cashing in as so many dollars in the pocket with the added advantage that until so used they are constantly making the nest egg bigger.

Was the Omission Intentional?

In our issue of Oct. 6 we published an editorial entitled "Need of an Adequate and Efficient Index to Current Gas Literature." In it we alluded to the Industrial Arts Index and the Abstracts of the American Gas Institute.

Within the past few days we have received an anonymous communication inquiring if we were aware that in the *Monthly Bulletin* of the National Commercial Gas Association there is being published regularly an index entitled "Gas Literature for the Busy Man," and if our editorial was not inspired through "sour grapes" because of fancied grievances about lack of mention of this journal's articles in that index.

We are not in the habit of taking cognizance of anonymous communications in these columns. Sometimes we run matter signed by fictitious names, but we know in this office what the author's real name is and that he is qualified to speak with authority on the subject under discussion. But we are inclined to depart from our usual custom in the matter of this particular communication. We suspect its source, and it is not any one closely identified with the National Commercial Gas Association. The utter lack of familiarity with "conditions as they are" revealed in the letter is a guarantee of that.

The index published in the *Monthly Bulletin* of the National Commercial Gas Association was not alluded to in the editorial in question for the simple reason that that editorial pointed out the need of an index to *all* current gas literature, and as we understand it, the index of the National Commercial Gas Association is devoted essentially to "commercial gas literature."

The insinuation as to animus because of alleged lack of mention in the columns of the index can be dismissed with similar brevity. We have before us the October *Bulletin* of the Association which has just come in. If we had had reason to reply to such a letter earlier we would have made use of the September *Bulletin*, and doubtless our reply would have been practically the same.

In this index we find 26 articles published in the AMERICAN GAS ENGINEERING JOURNAL listed as against 20 in the *Gas Age*, 14 in the *Gas Record* and 9 in the *Gas Industry*. Under the heading of Industrial Fuel we find 7 articles published in the JOURNAL listed as against 2 for the *Gas Age* and none for the other gas journals. Turning back to the Question Box we find a continuous list of references to articles published in the AMERICAN GAS ENGINEERING JOURNAL. When one remembers that this is essentially an index to "commercial gas literature," and that the JOURNAL is known essentially as the engineering journal of the gas field, it would appear that we have little cause for complaint with the listings we have received in the *Monthly Bulletin* of the National Commercial Gas Association. Especially should this be so, when for the past year or more, as we remember it, the ratio has been very similar to that in the October, 1917 number.

Why the Public Service Commissions?

Unhappy indeed is the gas company whose rates or standards come under discussion on the eve of a mayoralty election. Regulatory commissions sit in solemn conclave hearing the testimony of experts; then, presumptively, lay down a ruling based on the findings of these hearings. Nothing more logical or just, one would say.

But not so to the mayor, who seeks re-election. We have not grown so original as we imagined we had. The gas company as a punching bag for political preferment is one of our oldest institutions. Yet it is a means that is seemingly just as frequently employed to-day as it ever was.

The latest outbreak comes from the Mayor of New York City, a young man from whom we had expected better things. For quite some time the Public Service Commission for the First District has been engaged in sittings on the question of a change in gas standards. The usual array of experts have been heard. To date these have been mainly what might be termed the commission's experts. The gas companies have not as yet managed to get their word in. But this will follow in due course. In the end the commission should have before it sufficient evidence to make an intelligent finding, in which the consumer's interests will be provided for as well as the companies'; possibly even better.

But at this interesting point the Mayor of New York City has seen fit to put in his oar. There is an election impending. He serves warning on the commission that there is a watch dog at the door. It must be careful in its findings. He will see to it that the new standard is not established unless a lowered rate accompanies it.

The Mayor calls attention to the fact that if the gas were reduced to eleven candle power the consumer would be paying double price. To this we are inclined to say "bosh," but that would be undignified. Instead we respectfully suggest to his Honor, as he already privately is aware, that the question is not one of changing candle power, but of changing from a candle power to a heat unit standard of gas measurement. The figure he sets as to the difference in cost of gas to the consumer would be startling were it not absurd. The Mayor might contribute somewhat to his store of technical knowledge if he were to read up on the testimony already given at the hearing he has so hastily obtruded himself into.

His Honor further asserts "it would be an unwarranted hardship upon the poor, many of whom depend upon the open gas burner for illumination." On the contrary it would prove a blessing. The rich can afford the open flame burner; the poor cannot. They have to count their pennies.

Those who are using open flame burners are wasting money. We knew this years ago, but the testimony at the hearings has confirmed it, even figuring the cost of mantle replacements.

The poor were making no violent protests against the "bucket shops" of some years ago. They were content to waste their money pouring it into the bottomless hole. But benign government made it impossible for them to do so by driving out the gambling resorts. It would be an equally benign government that would prevent the poor from wasting their money on open flame burners by establishing a gas standard that, while making possible a better service to mantle users and cooking and heating customers, would make practically impossible the continued use of the open-flame burner.

We will not enumerate in full the Mayor's contentions. The answers to them would reveal nothing new technically to the gas man. The few cited are given mainly to illustrate the shallowness of the objections advanced by these political technicians.

Nor is this editorial directed against his political chances. THE AMERICAN GAS ENGINEERING JOURNAL is not interested in politics as such. Besides, if they had thought of it, doubtless his opponents would have been out with the same grand-stand methods, with the gas companies the victims.

Some time, we hope and pray, the public will realize that the shortest road to cheaper gas is in not doubting the gas company's motives in every question that may come up and in refusing to credit every politician who seeks, through playing on its suspicions to travel the easy way to public office.

A down-in-the-mouth gas company as a general thing means an industrially-stagnant community. Baiting the gas company is a form of gain somewhat comparable to that of taking a dollar from the left trouser pocket to put it into the right except that in the first case the dollar loses a few cents in transit.

Sub-Committee on Coal-Tar By-Products Issues Condensed Report On Recovery of Toluol from Gas Works

(*Continued from page* 355)

volume in washing with 2½ times its volume of 100 per cent sulphuric acid.

Note: The oil is vigorously agitated with the acid for five minutes and allowed to stand for two hours.

Care should be exercised in not allowing the smaller gas companies, not equipped with large laboratories, to use a quality of straw oil that will not readily separate from the light oil or emulsify with it, so that there shall not be an undue amount of wash oil going forward with the light oil or a loss in scrubbing efficiency by reason of some of the light oil remaining with the debenzolized oil.

Steps should be taken at once to secure a million gallons of such grade of oil, or a proper substitute, as previously stated, should be secured ahead, because it is clear that there is not going to be a large excess of creosoting oil of the quality required.

COST OF OPERATION

The cost of operation of the plants for separating the toluol fraction will be at a minimum in those large plants that are not required to restore the heating value or candlepower standards by the use of additional gas oil, which of course should be charged to the cost of the toluol. Until the method that will be pursued in financing and operating these plants is fixed upon, it would appear to be idle to speak of the cost of recovery. This recovery, as now conducted in various plants, ranges from 25 to 75 cents per gallon of crude toluol, exclusive of amortization, interest on investment or depreciation.

How the Gas Companies are Helping the Nation

THE WILKES-BARRE COMPANY, serving Wilkes-Barre, Pa., employees have invested $2,000 in Liberty Bonds. F. A. Kelley is general superintendent.

THE EASTHAMPTON GAS COMPANY, serving Easthampton, Mass., has ten men liable to draft. Six employees have already entered the military or naval service. No information is available as to the amount contributed to the Red Cross by employees, but, in the words of John N. Lyman, assistant treasurer, most everyone in the company's employ had a hand in helping that work along.

BENJAMIN B. SWARZ, who for the last two years has been with the appliance department of the Lynn Gas & Electric Company, Lynn, Mass., and who leaves with the next quota of men from Lynn for Camp Devens at Ayer, was recently given a farewell reception by the employees of the company, and was presented with a wrist watch and comfort bag.

B. W. COWPERTHWAIT, manager of the Faribault, Minn., division of Northern States Power Company, is

a member of the general committee of Rice County for the placing of the second Liberty Loan.

W. L. MILLER, manager of the Interstate Light & Power Company, Galena, Ill., is secretary of the local committee for the sale of the second Liberty Loan.

ROBERT MONTGOMERY, whose office as manager of the Commercial Department of the Louisville (Ky.) Gas & Electric Company is being filled temporarily by T. B. Wilson, has found the meals at the Officers' Training Camp at Fort Benjamin Harrison, Indianapolis, though hardy, much better than any Thanksgiving dinner he has ever tasted. The following schedule of his daily activities explain why:

Reveille	5.30 a. m.
Breakfast	6.00 a. m.
Drill	7.00 to 9.00 a. m.
Grenade throwing	9.00 to 9.30 a. m.
Signalling	9.30 to 10.00 a. m.
Bayonet exercise	10.00 to 11.00 a. m.
Physical exercises	11.00 to 11.30 a. m.
Dinner	12.00 m.
Technical studies	1.00 to 2.00 p. m.
Drill in offensive tactics	2.00 to 3.30 p. m.
Sketching	3.30 to 4.20 p. m.
Retreat	4.25 to 4.35 p. m.
Supper	6.00 p. m.
Technical instruction	7.00 to 9.00 p. m.
Taps	9.30 p. m.

When he arrived at the camp, Aug. 27, he weighed 133 lb. Now he weighs 145 lb. The course of instruction, according to his findings, is one which will cram more knowledge of a military nature and more red blood and "pep" into a would-be officer than was ever attempted before. Every man is right on his toes, and it is surprising how rapidly a man can learn when he is forced at high speed.

THE HONESDALE CONSOLIDATED LIGHT, HEAT & POWER COMPANY, serving Honesdale, Pa., has one employee liable to draft. Most of the company's employees have contributed to the Red Cross. F. H. Eisele is superintendent.

THE WISCONSIN GAS & ELECTRIC COMPANY is displaying at their Racine, Wis., office a Service Flag containing eight stars, indicating the number of men who have gone to the front from that company. At Kenosha the Flag shows 13 stars, making a total of 21 of the corporation's employees.

Gas Lighting Installation in Moving Picture Theatre Gives All Illumination Required Without Affecting Pictures

The Bangor Gas Light Company of Bangor, Me., recently made a gas-lighting installation in the Park Moving Picture Theatre in that city, which possesses novel features. A row of gas lamps is installed on each side of the hall. They are placed about 15 ft. apart.

The installation consists of a stiff bracket with a Junior Welsbach and shade holder and electric green reflector shade, which reflects the light on the wall back of them and gives a semi-indirect side wall illumination.

They give all the light in the room that is needed, but the light is so directed that it does not affect the pictures. These lights burn every afternoon and evening until the theatre closes. W. O. Merchant, Jr., is manager of the Gas Company.

Women Maintenance Workers an Actuality with Old Colony Company

Visit from House to House and Not Only Care for Gas Lights, but Adjust Ranges and Gas Irons as Well

By C. D. BOND

Old Colony Gas Company, East Braintree, Mass.

With the coming of the winter season the maintenance of residence lights and burners is foremost in the minds of gas company's maintenance departments.

For some time, even before the war broke out, we had an idea that women could work on house maintenance and give better service than men. We believed that women could meet women and instruct them in the care of burners and the various uses of gas better than men could.

When the first of September came we placed our maintenance men on other work, with the exception of one man whom we kept for industrial maintenance, and put on women for domestic maintenance work.

These women carried on the "paid maintenance" work until Oct. 1, when a "free maintenance" plan was put into effect. Under this plan they visit from house to house in the several towns served by us and charge only for materials used, making no labor charges whatever. They also adjust stoves and gas irons.

As the maintenance women work directly with the sales department they pick up many orders that otherwise would not be obtained if these calls were not made regularly.

We believe that this plan will give better satisfaction to both consumer and company and help to solve the maintenance problem during the war.

Enough New Business in Hotel and Restaurant Fuel Field to Increase Gas Company's Output from 15 to 25 Per cent

W. E. Dugdell Declares Fully Ninety Per Cent of Hotel and Restaurant Owners Are Anxious to Use Gas Fuel Exclusively and to Pay a Reasonable Amount Above Cost of Other Fuels to Obtain It

From data obtained in some twenty odd towns on the Pacific Coast it was found that the volume of hotel and restaurant fuel business awaiting gas companies was sufficient, if secured, to increase the output from 15 to 25 per cent. It was further determined that fully 90 per cent of hotel and restaurant owners were really anxious to use gas exclusively, and for this privilege were willing to pay a reasonable bonus above the cost of other fuels and their attendant items of expense, declared William E. Dugdell in his paper on that subject, presented at the annual convention of the Pacific Coast Gas Association.

In spite of these favorable conditions, however, we find that on an average the gas interests have obtained less than 30 per cent of the possible business in this field. Bearing in mind the fact that it is now some ten or twelve years since the first serious efforts were made to develop these sales, this percentage appears entirely too low. Whether or not this condition prevails in other sections of the country I am in no position to say. It probably, however, is typical, as these

towns ranging in population from five to two hundred and fifty thousand are no doubt more or less representative of the general order.

Fuel User Skeptical

While fuel users evince a desire to use our product, they are possessed of a doubt as to its adaptability and probable cost. It naturally follows that, if we are to enjoy the full revenues to be derived from this source, the removal of these doubts rests entirely upon the shouders of the gas fraternity. Whether we are in a position to-day to accomplish this desired result is very questionable.

There are many types of hotels and restaurants, each with its particular methods of preparing and serving foods. Among these we find: The first-class hotel and grill, serving meals table d'hote and a la carte at all hours; the American plan hotel, serving meals table d'hote at given hours; the cafeteria, serving but two meals per day, and the cafeteria serving three meals per day; the dairy lunch—some serving meats and others confined to the sale of dairy products; the straight short order house, confined strictly to fried foods, and the combination restaurant and short order house—serving regular meals at given hours, and short orders over the remaining period of the day.

In addition we have bakeries, tea rooms, light luncheon parlors, etc.

Time will hardly permit covering each of these types in detail. It will suffice to say that fuel costs vary, and the gas appliance necessary to insure the highest operating efficiency is determined by the method of cooking, number of operating hours, and class of service rendered their patrons.

Determining Factors

Aside from the educational features, the development of these sales rests principally upon three factors: The offering of attractive rates, the development of more efficient appliances, and service.

The average hotel and restaurant operates over a period of from fifteen to eighteen hours per day with an equipment consisting of two or three ovens with from ten to fifteen square feet of top cooking surface; and an average fuel bill including solid or liquid fuel for main cooking and gas for secondary appliances is approximately $45 per month. This figure includes all water heating for kitchen use obtained through coils in the range.

We find in most cases a fixed fuel expense, regardless of number of meals served, while the changing of cooks has but little, if any, material effect on the monthly fuel cost. With the above equipment it is possible to serve from 500 to 1,000 meals per day, depending largely on the class of cooking.

To obtain equal results with gas requires a consumption of from 75,000 to 125,000 cu. ft. of gas per month, depending largely on the operator.

The fact that any number of cooks can operate a coal, wood or oil range at a fixed expense does not necessarily imply that the same is true with gas. The fact of the matter is that it is quite to the contrary, and with each change of cooks there is usually a difference in the monthly cost.

As a concrete example showing an actual comparison of fuel costs, I have in mind a certain hotel that, using crude oil for fuel at 85 cents per barrel, had a monthly cost including all extras of $48. From records kept it was found that these bills had not varied $5 per month in two years.

Twenty Per Cent Maximum Cost Difference Customer Can Afford

Gas was installed with the most modern type of gas range and with 70-cent gas it cost $75 per month. This installation was kept under constant watch by the gas company and daily readings taken of the meter. After two months this vigilance was discontinued, and the cooks, working under a strain to keep it at the above figure, relaxed, and the bills increased.

These bills now range from $85 to $100, and on the whole gas has cost 100 per cent more, therefore, bearing in mind that allowance had been made for all extras, this increase must be charged to service alone.

Now, what is a reasonable price for service? This particular consumer paid a pretty high price for it. Fortunately this was an extremely good paying hotel, and they will probably continue to pay this exorbitant bonus until such time as the management changes hands, or a cut in operating expenses becomes necessary.

It has been my experience that a 20 per cent bonus for service is the maximum increase the majority of these places can afford. It is at least the extreme limit of safety if we expect to enjoy these revenues with a fair sense of security. In order to obtain the bulk of this business, allowing 20 per cent for service, it would appear that, using the present type of hotel range, we must sell gas around 50 to 60 cents per thousand.

Price at Which Gas May be Sold

It has truly been said that the cost of coal, wood or oil actually determines the price at which gas may be sold, and those companies in a position to grant these low rates are indeed fortunate. On the other hand there are hundreds of small companies sorely in need of this business, with output so limited that such rates are probably impossible.

No doubt more intensive selling methods would increase the output sufficiently to effect some reduction in rate, but not to the level required, as I learn from many sources that we have about reached the minimum in cost of production, and, owing to the present increased cost of materials, the tendency in rate making in the future will probably be upward.

Low Rates Not the Solution

Are low rates the logical solution? Personally, I think not, and I will venture the statement that they will never solve our hotel and restaurant fuel problem, for low rates to the writer's mind encourage waste, and retard the development of efficient appliances. I believe we have reached a point where the maximum development of this business will depend largely, if not entirely, on the development of more efficient appliances.

Our present types of hotel ranges have served their purpose to a limited extent; their adaptability has been determined almost entirely by the rate paid for gas, and each type has had its particular place in this field. Few of them, however, are constructed to conform with the methods to which most cooks have been educated in preparing large quantities of food for public consumption, and, with the exception of the open top range installed in the straight short order house, few if any of them are really practical for all round cooking. This statement will bear analysis.

As stated above the average hotel or restaurant range consists of two or three ovens with from ten to fifteen square feet of top cooking surface, both top cooking surface and ovens being heated from one source. This is known as the French range, and it is almost impossible to convince a cook that it has ever had an equal, and I believe they are right, as it permits any and all kinds of cooking at the same time, from heavy boiling and roasting to the making of hot cakes, frying of steaks, etc. This range may be maintained at a cooking temperature over a given number of hours at a fixed fuel expense, at the same time heating all water.

Manufacturers and gas men advance many arguments against maintaining fire and keeping ovens heated during slack hours, but for the most part these arguments and theories are impractical and selling points purely, as it depends entirely on the methods of cooking, and the service rendered their patrons whether or not it is practical to permit the range to become cold. It is true that the quick acting gas oven requires but little time to heat, yet to serve hot bread from a cold oven requires at least thirty minutes. To serve game, oyster loaves, baked shell-fish, individual squab, chicken au gratin, and numerous other dishes, an oven must be kept ready at all hours. Knowing the impatience of the public while waiting for their meals few chefs will allow their service to be impaired for the sake of keeping down fuel bills.

Educating Cooks an Impossibility

The education of a cook in the economical use of gas is for the most part more or less of an impossibility. Few of them when practical will avail themselves of the opportunity to economize through the unit system of ranges.

Gas is without question the most sanitary fuel in the commercial world to-day, but a chain is only as strong as its weakest link. The average hotel unit is not constructed on sanitary lines; there are too many cracks and crevices, too many valves and air mixers, grates, drip pans and trimmings, on which grease accumulates and is seldom removed. Attempts at frying steaks on top plates of these ranges result in grease running down the sides between units where it cannot be reached or saved, and I have known of cases where fires resulted from this source.

The solid top French range with its smooth surface and trough for catching grease overcomes this. In this manner the grease may be saved, and made into soap, thereby effecting additional economy.

The majority of chefs and cooks are mighty fine fellows, but they are the most temperamental set to be found in any vocation. Taking great pride in their art, they naturally resent any attempts to alter their methods. Chefs are artists who find their work is fascinating and absorbing—so much so, in fact, that a noted traveler once remarked that in spite of the most obsolete and antiquated cooking appliances the art of cooking had developed to a higher degree in China than in any country he had ever visited.

To the writer's mind it appears far more logical to build a range to meet with their requirements than to attempt the impossible feat of converting thousands of cooks to new methods which their very nature causes them to resent, and I am firmly convinced that the gas range that will meet with their entire approval and afford them the same service to which they have been accustomed is still to be developed.

This range will have to be of a solid top type with one fire control permitting ovens to be heated at all hours, and water heating facilities combined, and constructed on sanitary lines. Its thermal efficiency must be such as to permit its use at rates generally prevailing throughout the country. The human factor that now plays such an important part in determining these fuel bills must be removed as nearly as possible, and it is necessary that we protect the cook against himself. Can such a range be produced?

Insofar as the writer is aware the development of the present type of hotel range has devolved almost entirely upon the manufacturers. At least it is certain that full use has not been made of the knowledge and experience of the engineers, chemists and hotel salesmen connected with the gas companies. Had there been a fuller co-operation a more efficient appliance must have resulted.

Service

Service as the writer sees it is a commodity. It is that for which the consumer pays the difference in price between gas and other fuels. It is "Service" that actually makes the sale of gas possible to a hotel or restaurant.

When we place one of these consumers on our ledgers, we assume their entire fuel responsibilities. Their success depends largely on fuel and to that extent their success depends on the service we render.

To render efficient service when the volume of business warrants, a department should be established for the sale, installation, and maintenance of these appliances. By this method the gas company can keep in closer touch with these large consumers and advise them in the purchase of appliances, as the rendering of efficient service depends largely on the type of appliance installed.

The majority of hotel and restaurant owners prefer to buy direct through the gas company, as they feel that we are a permanent institution and that their interest is ours. Regular semi-monthly and, if possible, weekly inspections should be made of all appliances. Meters should be read at the same time and a record of these readings turned in each week to the head of the department, thus enabling us to head off high bill complaints, for an ounce of prevention is worth a pound of cure, and increased consumption caused by changing cooks can immediately be called to the attention of the owner. Bills for gas, labor and appliances should pass through the head of this department before delivery; this will prevent error before bills reach the consumer and sow seeds of dissatisfaction.

Success of Installations Depends on Minor Details

The success of these installations absolutely depends on these minor details. If we are to render good service we must also have the consumers' assistance. We must insist on their help.

It is necessary to impress upon them the value of gas service; no matter how small the hotel or restaurant installation, it should receive the same careful attention for service as the forerunner of new and larger sales. It is the most efficient and highest class salesman in the gas business. Service decreases complaint costs. We are being paid for service. Complaints are a dead loss.

Each day or week we allow a cook to operate a gas range under adverse conditions lessens his faith in gas fuel and the gas company. We are much in the same position as the grocer, the butcher or baker, who, should

they neglect these large consumers for the slightest period, would lose their business to some wide-awake competitor in less than forty-eight hours, and we, like them, have powerful competitors in the field.

Efficient service is the best tonic known to promote good salesmanship. Back a salesman with good service and there is no job too big for him to tackle, for it instills confidence in the commodity he sells.

Volumes could be written on this subject alone, but we would merely be traversing old ground. We all know what constitutes service and the bearing it has, not only on these sales, but in every branch of the gas industry.

Saturation Point Could be Reached in Five-Year Period

A study of this field can hardly fail to convince one of its magnitude and importance. Here we find a most desirable class of consumers in a sense actually soliciting us, and I know of no other field offering an equal volume of new business wherein the saturation point may be reached in as short a period of time under proper conditions.

With efficient appliances I will venture to say that it should be possible to reach this point in from three to five years' time. Under existing conditions, however, our efforts for the most part must be confined to three types of hotels and restaurants: The straight short order house using the open top range; the extremely large hotel in a position to pay a large bonus for service, and to which our more attractive rates may be applied, and the small owner doing his own cooking, who, by conservative use, finds gas within his purchasing power.

The medium sized restaurant offering by far the greater portion of the business is the type we are least prepared to secure.

Waiting and hoping that other fuels will advance in cost to a point where gas can compete with them is to the writer's mind a sign of weakness. Increased cost of other fuels mean an increased cost of gas manufacture, and we remain practically in the same position.

Business that Cannot be Held of no Value to Gas Company

Until such a time as we are better prepared to secure the bulk of this business the salesman has much work ahead of him. He must pave the way for this invasion. He must plod along securing that portion of this business within his reach, at the same time creating the desire for his product in the minds of the remainder. He must be careful of the installations he makes. Each attempt that fails will make his task doubly hard in the future. No matter how slow this business may appear to develop, he must never make an installation for the sake of a sale. Business that cannot be held is of no value to his company.

Unquestionably the greater percentage of failures in this field may be traced to ill-placed appliances and attempting installations when one's better judgment tells him it cannot be held. If after studying conditions in one of these places and his better judgment tells him the business cannot be held, he should tell his prospect so. The prospect will admire him for it and then will be created in that person's mind a faith that nothing can shake, and when he is really prepared to serve them they will buy without looking at goods. While but a unit, the impression he leaves is the consumer's impression of his company. He must have faith in the commodity he sells and be proud of it, for he has something worth selling. Without faith in his goods he will meet with but little success.

Increase in Petroleum Consumption in First Months of Year 7 Per Cent Greater than Increase in Production

The following table, prepared by J. D. Northrop, of the U. S. Geological Survey, shows the quantity of petroleum marketed, the stocks of crude oil on hand at the end of each month, and the consumption of petroleum in the United States, as calculated from these statistics, since the beginning of 1916.

The statistics for 1917 are based on statements filed monthly with the U. S. Geological Survey by the principal pipe-line and refining companies, except those in California, that handle petroleum or receive it directly from the field, but include certain estimates, such as that for oil consumed in the field for drilling, for which exact statistics are not at hand.

Crude Petroleum Marketed, Consumed and Held in Stock in the United States, January, 1916, to July, 1917, Inclusive, in Barrels of 42 Gallons Each

Month.	Quantity marketed.	Consumption.	Stocks.
1916			
January	23,181,022	21,115,549	187,965,265
February	22,733,550	21,126,277	189,572,538
March	25,523,666	25,755,303	189,340,901
April	24,024,447	24,804,985	188,560,363
May	26,015,713	25,418,752	189,157,324
June	25,539,611	26,563,582	188,133,353
July	25,379,700	24,229,287	189,283,766
August	25,206,566	28,328,130	186,162,202
September	25,261,174	28,750,037	182,673,339
October	26,747,529	28,215,247	181,005,621
November	25,301,138	28,438,809	177,867,950
December	25,853,042	29,692,641	174,028,351
Total 12 months	300,767,158	312,438,599	174,028,351
Total 7 months	172,397,709	169,013,835	189,283,766
1917			
January	27,431,000	28,795,000	172,664,000
February	24,399,000	24,960,000	172,104,000
March	28,448,000	29,322,000	171,230,000
April	27,615,000	27,933,000	170,912,000
May	28,202,000	29,791,000	169,323,000
June	27,917,000	29,182,000	168,057,000
July	29,344,000	30,794,000	166,607,000
Total 7 months	193,356,000	200,770,000	166,607,000

This table shows an increase of 12 per cent in the quantity of petroleum marketed in the first 7 months of 1917 compared with 1916 and of nearly 19 per cent in the quantity consumed in the same period. Stocks of crude oil held by pipe-line companies, marketing agencies, and refiners who receive all or part of their oil direct from wells increased 3,383,974 barrels during the first 7 months of 1916, but decreased 7,421,000 barrels in the corresponding period in 1917. The average daily draft on stocks in July, 1917, was 47,000 barrels, and the average for the first 7 months of the year was 35,000.

News of the Gas Industry

California Commission Authorizes Ukiah Minimum Charge

The Railroad Commission has issued an order authorizing the Ukiah Gas Company to put in effect on Nov. 1 a minimum charge for gas service of 75 cents for each meter each month. The present minimum rate is 50 cents, and the company asked the commission for permission to charge $1.

The company operates an artificial gas plant in Ukiah, serves 425 consumers, making gas from oil costing $1.40 a barrel. The company values its property at $35,865, and its gross revenue for the year ending May 31 last was $9,102. The net revenue was $1,190, or 3 1-3 per cent for interest and depreciation upon the property. In the future the company will have to pay a 2 per cent franchise tax on its gross revenue, thus further decreasing the net return upon its investment, and the minimum increase is allowed for this reason.

The decision of the commission says that investigation of the minimum cost of serving consumers on this company's system and certain other similar companies in California, shows that the cost approximates 75 cents each month for each consumer.

Champaign Company Withdraws Application for Heat Unit Standard

The Public Utilities Commission on request of the petitioners dismissed application by the Urbana & Champaign Railway, Gas & Electric Company, of Champaign, Ill., to change the system of measuring gas from a candle power to a heat unit basis.

Newly Drilled Well to Supply Toronto, Kan.

Frank Dollman and Lew Bickel of Parkersburg, W. Va., recently arrived in Toronto, Kan. They have a large block of territory under lease there and have recently drilled in the largest gas well in that section of the state. The city of Toronto will be supplied with gas from the well, a franchise having already been granted.

Fire Destroys Coke Hopper of Milwaukee Company

A spectacular fire in the Menomonee Valley at 4:30 a. m., Oct. 6, swept the four-story steel, concrete and frame coke hopper of the Milwaukee Gas Light Company, at Canal and Twenty-fourth Streets, causing an estimated loss of about $30,000. The fire started, it is thought, from hot coke in the hopper. A second alarm was sent in.

The principal loss is on valuable machinery in the building which is used in grading the coke before it is loaded on wagons. It is said that about 5,000 tons was in the hopper at the time. The firemen worked in danger of falling timbers.

The burned structure is 30 ft. wide and 200 ft. long. It is across the railroad tracks from the two huge gas tanks of the company, but these were in no danger. According to officials of the company, the fire will not interfere with the operation of the plant or the distribution of coke to customers.

Cincinnati, O., 35-Cent Rate in Effect Pending Appeal

The State Public Utilities Commission ruled at Columbus, O., recently that the 35-cent gas rate schedule filed by the Union Gas & Electric Company remains in effect pending the company's appeal from the 30-cent rate ordinance recently passed by Council.

The gas company's bond, insuring refunder to the public in case the 35-cent schedule is knocked out, was fixed at $250,000.

City Solicitor Groom's petition to dismiss the company's appeal from the 30-cent rate ordinance was overruled.

Athens & Sayre Company to Increase Rates

Officials of the Athens (Pa.) & Sayre Gas Company have filed with the Public Service Commission at Harrisburg a request for permission to raise rates.

The company announced recently that the rate would be increased and made uniform on Nov. 1. Formal notice has been given the Borough Council.

Forty Per Cent Increase in Effect at Princeton, Ill.

An advance of 40 per cent in the gas rate in Princeton, Ill., has gone into effect and bills sent out by the Princeton Gas Company for the month of September were charged at the new rate of $2 per 1,000 cu. ft. The new rate has been approved by the State Public Utilities Commission as a result of a hearing, at which there was no opposition made to the proposed increase.

F. C. Duncan, manager of the Princeton Gas Company, in making application to the commission for the increase in rates, declared that for a number of years the property in Princeton had been losing money. He said that before the war the earnings of the plant were not sufficient to pay the expenses and the interest on the bonds, and that during the last year labor and materials have increased to such an extent as to make it impossible to run the plant at the old rates.

At a recent conference with Mayor Anderson and members of the City Council when the application was pending, Captain Duncan exhibited the books of the company and an auditor's report to show that the plant was not making a profit. The company was then charging $1.50 per 1,000 cu. ft. with a discount of 25 cents per 1,000 cu. ft. if paid by the 10th of the month. From the new rates of $2 a discount of 25 cents a thousand will be made if paid by the 10th of the month and 50 cents a thousand discount on industrial usage. The householder who formerly paid his bills promptly and secured a rate of $1.25 must now pay $1.75 when he settles promptly, an advance of 40 per cent.

Appeal for Gas Made at Spring Valley, Ill.

The city of Spring Valley, Ill., and the citizens thereof filed a complaint with the State Public Utilities Commission against the Spring Valley Gas Company and the Spring Valley Utilities Company for discontinuing operation of the gas plant at Spring Valley. The complaint alleges the companies are requiring gas consumers to equip their premises with electric current.

Rates at Marquette, Mich., Jump 28 Per Cent, Which Is Only Half of Increased Costs

The Marquette (Mich.) Gas Light Company recently addressed to its consumers a circular letter announcing an increase, Oct. 1, of 28 per cent, or to $1.60 net, a 1,000 ft., in the price of gas. This increase is, it is said, about half of the increase in the cost of manufacturing gas now compared with the cost in the period prior to two years ago. Officers of the company presented the matter to members of the city commission, and that body approved the proposed increase.

The company has been hard hit by the increases in the prices of coal, material and labor, particularly coal, which is now costing the company in excess of 100 per cent more than it did two years ago, and 90 per cent more than it cost one year ago. Two years ago the annual coal supply cost the company $14,000. This year it will cost approximately $28,000. Labor and material have advanced from 25 to 75 per cent during the two-year period.

The proposed price of $1.60, net, a 1,000 ft. is an advance of thirty-five cents over the old price. For instantaneous water heaters and for commercial purposes the price will be $1.20 a 1,000 ft.

Company's Statement

In explaining the increase the company says that "at the present price the stockholders of the company, who have never received any return on their stock, would actually be obliged to pay out of their own pockets a large proportion of the expense of furnishing gas to citizens of Marquette.

"You will readily appreciate that the men whose money has gone into the construction and maintenance of this company cannot be expected to carry such a burden. There is only one way for this company to remain solvent, and that is to increase the prices of its product, which consist almost entirely of gas and coke, since it has always been the policy of the present management to install gas appliances at cost.

"We do not ask you to bear all of this increase in our production cost. We ask you only to meet us half way, and as soon as the prices decrease we will make corresponding reductions in the rates which we now propose to charge."

The company further says: "We are planning all the economies possible, and to begin with the officers of the company agree with the consumers that they will draw no salary for the management of the property until prices of material and labor are reduced. If you can possibly see your way clear to increase the use of gas the sooner can the prices be reduced, as it is a well known fact that the greater the volume the less cost per unit to produce, this, of course, regardless of the price of coal and labor."

Richmond Officials Want Estimated Cost of Operating in 1918

The Administrative Board of Richmond, Va., directed W. P. Knowles, superintendent of the gas works, to prepare a statement showing the estimated cost of operating the gas works in 1918, and the probable receipts of the department from the sale of gas and other sources. The board wants this information before it in considering the money required for the operation of the department in the coming year.

Chicago Complaints Due to Consumers' Inaction

In answer to the flood of complaints that have poured into the offices of the Peoples Gas Light & Coke Company of Chicago and those of the municipal department of public service as a result of the company's change in the standard of its gas in accordance with a recently enacted ordinance, Commissioner of Public Service Garner announces that tests made by city investigators show the gas to be of a higher standard than is required by ordinance.

The new law authorizes the company during the present period to reduce the standard of its gas to 12 candlepower and to a heating power of 565 British thermal units. The city's tests showed 602 B.t.u. at the city hall, 564 to 601 on the north side of the city, 593 to 603 on the south side and 613 on the west side. It showed the minimum candlepower to be 12.20 in some sections of the city, 13.75 at the city hall, 13.59 on the west side, and 16.02 to 16.48 on the south side.

The gas company is employing 200 inspectors to readjust stoves and lights so that they will get the best possible service with the new gas. After Feb. 1, 1917, according to the ordinance, the company can furnish gas with a candlepower as low as 9.

The complaints are due largely to the fact that thousands of consumers failed to take advantage of the company's offer of free mantles where only open flame lights were being used.

Despite Protests Natural Gas Ordinance is Passed in Los Angeles, Cal.

In the face of vigorous opposition from various industries both inside and outside of Los Angeles, together with that of the Southern California Gas Company, the adoption of the natural gas ordinance was decided. The City Council at the conclusion of an all-day hearing, by a vote of five to four, passed the measure requiring the local gas companies to supply their consumers with straight natural gas.

When Mayor Woodman signs the ordinance and it becomes effective, steps will be taken by the city to have the State Railroad Commission fix the price for natural gas.

For several hours the debate was waged, the proponents of the ordinance being few in number. The facts brought out by the opposition were such that the Council hesitated to vote on so grave a matter.

When Neil B. Sinclair, president of the Industrial Gas Consumers' Association, told the Council that the shipbuilding now in progress at San Pedro would be seriously injured, the members of the Council were all attention. President Sinclair told the Council that "Uncle Sam expects us to do our bit here and is counting on the ships now in construction at San Pedro to help fight the submarine peril." The necessity of natural gas being supplied direct to the Los Angeles Shipbuilding and Dockyards Company at San Pedro was brought out, and the Council was asked not to enact an ordinance that might weaken an arm of the United States Navy.

An appeal was then made by Arthur W. Kinney, chairman of the Industrial Committee of the Chamber of Commerce, who asked the Council to refrain from passing an ordinance that would embarrass industries in and adjacent to Los Angeles.

"I can't imagine Kansas City, Kan., enacting legislation that would

injure the manufacturing interests of Kansas City, Mo.," he said. "Therefore, I cannot think the Los Angeles City Council would enact a law that would injure our adjacent territory, where thousands of men are employed, and where we have many thousands of dollars invested."

Julius Conrad, representing the biggest glass factory in the West, then told the Council that his pay roll is $10,000 per week. He said his factory would be forced to close down if the ordinance was passed.

The directors of the Industrial Gas Consumers' Association are to hold a meeting to consider what action to take. It is possible that a referendum will be invoked and the question be put up to the people showing the danger to the domestic consumer, whose gas rate, according to Fulton Lane, may be raised under the gas ordinance just passed.

Mayor Woodman said he will seriously consider every feature of the gas ordinance before he determines whether to sign it. He has ten days in which to consider it.

Atlantic City Gas Company Drops Rate Question

That the Atlantic City Gas Company had decided to give up the matter of trying to get an increase of ten per cent advance over their present rates charged consumers in this city, was learned by those who attended the meeting of the Chamber of Commerce in Atlantic City, N. J., recently. The matter developed at the conclusion of a report made by Chairman Schroeder of the committee appointed to look into the matter.

Carlton Godfrey declared that the people of the city should not stand for any such proposition as had been offered. He said the company was entitled to a fair return on what money had been paid in, but they were asking for more and that their request should be refused.

John T. French said there was really no need of any further discussion of the subject. He said he had been told by Mr. Geist of the gas company, that in view of the fact that the Government was taking hold of things, with a promise that the prices of coal and oil would be decreased within a short time, which would result in their being able to purchase their raw materials cheaper, they would not need to ask for any increase in the price of their product, and they had decided to let the matter drop.

Price of Gas Advanced at Salem and Peabody, Mass.

Beginning with Oct. 1 the price of gas to consumers in Salem and Peabody, Mass., was advanced $1.10 per 1,000 ft. net. This is an increase in price of 10 cents per 1,000. The Salem Gas Light Company some time ago made announcement of the fact that it would raise the price because of the greatly increased cost of coal and oil. The increase was to date from Oct. 1. The company stated it hoped the increase would be only temporary, expressing the hope that the prices of coal and oil would go down so as to allow of the rate which has prevailed to date.

Boston Output Shows Increase for September

The gas output of the Boston Consolidated Gas Company for September was 485,865,000 cubic feet, an increase of 8.9 per cent over the corresponding month a year ago.

Atlanta's Industrial Fuel Activities

Some of the industrial gas business that the Atlanta (Ga.) Gas Light Company has recently closed included: One Garland range, one No. 215 Blodgett bake oven, and two large cake griddles for Georgia School of Technology.

Two cake griddles for the Georgia Military Academy at College Park, which has converted its coal bake ovens into gas ovens.

An unique installation at the Swift Packing Company; one No. 8 Ruud automatic heater and one 10-horsepower Ofeldt gas-fired steam heater. This apparatus will be used to cook 3,000 pounds of wieners a day.

The Healey building cafe has abandoned coal fuel for gas.

Patents Pertinent to the Gas Industry

Pipe Hanger Made in Three Sections

Patent No. 1,221,705; described in Patent Office *Gazette*, April 3, 1917, page 244. Wilbey C. Duke, South Richmond, Va. Filed May 15, 1914. Serial No. 838,832. Renewed Sept. 15, 1916. Serial No. 120,418. (Cl. 248-31.)

This pipe hanger comprises an inverted U-shaped member with holes in the leg portions which are opposite each other. Through the top of the U is a hole, the screw or nail passing through this hole. The pipe ring has a supporting rod, which extends into the U, a bolt which passes through the holes in the U also passing through a hole in the support.

Method of Obtaining Products from Petroleum by Decomposition of Component Hydrocarbons

Patent No. 1,221,790; described in Patent Office *Gazette*, April 3, 1917, page 273. Horace P. Chamberlain, Buffalo, N. Y., assignor to Standard Oil Company of New York, N. Y. Filed Oct. 20, 1913. Serial No. 796,310. (Cl. 196-25.)

This process consists in operating upon an oil which contains paraffin wax or liquid hydrocarbons with viscosities too great for normal constituents of kerosene, by distilling the oil at decomposing temperatures under a superatmospheric pressure of not less than 30 lb. per square inch.

Gas Burner Provided with Heat Distributing Laterals

Patent No. 1,221,535; described in Patent Office *Gazette*, April 3, 1917, page 188. Theodore A. Holmberg, Cleveland, Ohio. Filed Oct. 12, 1916. Serial No. 125,153. (Cl. 34-18.)

This burner consists of a casing which is provided with heat distributing pipes extending from its sides. Air distributing laterals are also provided in alignment with the former pipes. Gas burners are placed above the open bottom of the casing and below the heat and air distributing laterals.

Gas Range Constructed with Movable Rack for Broiling

Patent No. 1,223,647; described in Patent Office *Gazette*, April 24, 1917, page 1028. Arthur W. Walker, Malden, Mass., assignor to Walker & Pratt Manufacturing Company, Boston, Mass. Filed Sept. 8, 1914. Serial No. 860,507. Renewed June 3, 1916. Serial No. 101,644. (Cl. 126-41.)

Suspended beneath the broiling burners of an upper oven range are parallel motion hangers. A broiler support is carried by the hangers, with side portions which act as wind shields. The broiler can be moved upward and downward at will but the rack is always parallel to the burners.

SHOWING ARRANGEMENT OF REFLEX LIGHTS FOR ONE OF THE OFFICE FLOORS

Railroad Employees Express Preference for Gas Over Electricity After Trial Installation

Welsbach Company Gains Lighting of Entire Building Purely on the Merits of Gas as Shown in Their Demonstration

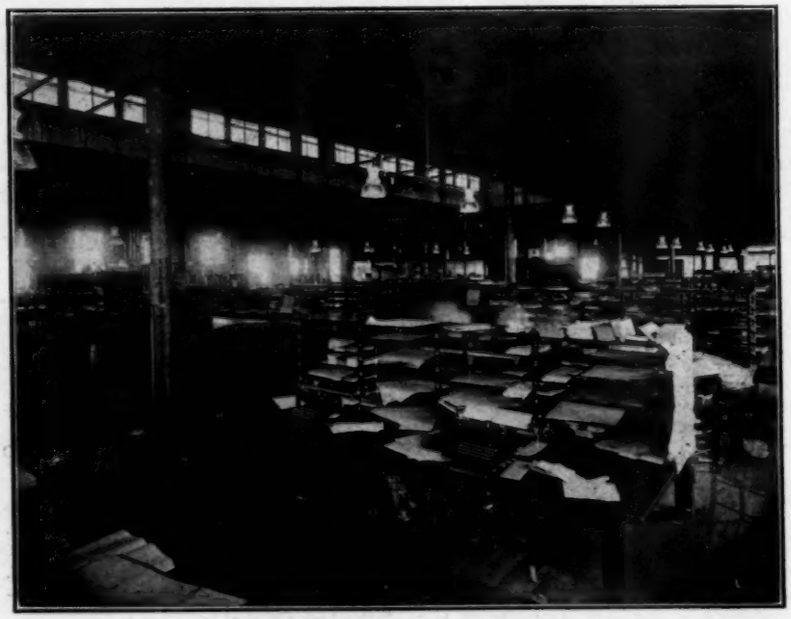
Gas lighting has proved its value in many of the industries, particulary those requiring some especially clear light as, for instance, the dress goods department of dry goods stores, etc.

One of the installations which has recently been brought to the attention of this journal shows the preference given gas lighting for the ordinary office work.

The Minnesota Transfer is a railroad building 110x80 ft. Electric lights were in use, when it was decided by W. W. Stephens, St. Paul manager of the Welsbach Company, to attempt a demonstration of gas lights, and so work up a practical comparison of the two illuminants.

The first floor, 75x80 ft., is used as offices, and the second and third floors are larger—the former being 72x110 ft. and the latter 80x110 ft. Trial Reflex lights were installed, and after working under this for some time, the clerks were given the opportunity to express their opinion as to which formed the most suitable lighting for efficient work at night. The preference was given to the gas lighting, and the building is now equipped with No. 840 Reflex lights with No. 8152 Holophane Shades. There are 26 lights on the first floor, 42 lights on the second floor, and 60 lights on the third floor, making a total of 128 lights.

On the third floor there are 52 desks approximately 6x4 ft. with 2 Reflex Lights installed over each desk. These desks accommodate 4 clerks, and the lights are placed similar to those shown in the accompany photos. There are 8 desks in this building using one light, 3 large desks with 3 lights, making a total of 121 lights used over desks. The lights are placed 4 ft. 6 in. from the desks. The total of 121 are furnishing illumination for 217 clerks; 45 clerks work all night in the building. They have 7 lights in use for general illumination.



ONE OF THE RAILROAD'S LARGE OFFICES WELL LIGHTED BY GAS, IN WHICH PART OF THE COMPANY'S 217 CLERKS WORK

Advance in Gas Range Prices at Chicago

A general advance of 20 per cent in the retail price of all styles of its Composite Gas Ranges is announced by the People's Gas Light & Coke Company of Chicago, Ill., effective Oct. 15. These ranges are built by eight manufacturers according to the specifications of the People's Company, which announces that the price advance was made necessary by the increase in the manufacturers' costs. Before putting the increase into effect the company warned the public and carried on a big selling campaign, allowing its patrons to take advantage of the old price for one week.

Personal Notes

R. C. COFFY, vice-president of the Puget Sound Gas Company, has been appointed a member of the committee of five to draft constitution and by-laws for a new civic booster club for Everett (Wash.), merging the city's present commercial clubs.

S. B. IRELAN, of the City Light & Traction Company, Sedalia, Mo., has been transferred to the Montgomery (Ala.) Light & Water Power Company. H. D. Feuers, general manager of the Fremont (Neb.) Gas, Electric Light & Power Company, succeeds Mr. Irelan at Sedalia, and A. B. Wynne, superintendent of the Mansfield (Ohio) Electric Light & Power Company, succeeds Mr. Feuers at Fremont.

ARCHER BISHOP was recently appointed secretary of the Knoxville (Tenn.) Gas Company. He was formerly with the Bristol (Tenn.) Gas & Electric Company, holding the position of general bookkeeper for the past four years. He succeeds B. Aubrey Smith, who has been transferred to the Spokane (Wash.) Gas & Fuel Company. All of these companies are operated by the Doherty Organization.

F. H. VENN, for the past year and a half employed in the commercial department of the Blackstone Valley Gas & Electric Company, Woonsocket, R. I., as salesman and power engineer, resigned recently to accept a position in the developing department of the United States Rubber Company, at New Haven, Conn. On leaving he was presented with a black walrus traveling bag by his fellow employees. Mr. Venn had been chairman of the house committee of the Employees' Club. Clarence D. Roberts, information clerk, succeeds Mr. Venn. Anson Wheelock, clerk in the commercial department, succeeds Mr. Roberts, and Dorothy Walling is now acting as clerk in the department.

THE SAFETY GAS MAIN STOPPER COMPANY has announced a change in their address. They were formerly at 133rd Street and Alexander Avenue and are now located at 257-263 East 133rd Street, New York City.

W. W. DELONG was elected general manager of the Appleton (Wis.) Oil & Gas Company at a recent board of directors' meeting.

CHARLES OTTEN, JR., who for the past four years has been superintendent of the Haverhill (Mass.) Gas Light Company, was recently transferred to the Pawtucket (R. I.) Gas Company as superintendent. Clarence Lewis, superintendent of the Pawtucket plant, succeeds Mr. Otten at Haverhill. Both companies are under the management of Stone & Webster. The employees of the Haverhill company gave a luncheon on Monday evening, Oct. 8, in Mr. Otten's honor, after which farewells were extended and best wishes expressed for his future success. Frank Roberts, manager of the company, presented Mr. Otten with a half dozen pieces of silver as gifts of esteem from the employees.

GEORGE BUCK, chief clerk at the Consolidated Light & Power Company, Kewanee, Ill., for the past three years, has been promoted to the auditing department of the American Gas Company, Philadelphia, of which the Consolidated is a subsidiary, and will assume his new duties Nov. 1. J. C. Gilmour, who recently arrived at Kewanee from the company's plant at Rockford, took over Mr. Buck's work on Oct. 15. Mr. Buck has been in the service of the American Gas Company for the past fifteen years.

THE ORANGE COUNTY LIGHTING COMPANY has changed hands and is now the Orange County Public Service Corporation with officers in Philadelphia.

Construction Notes

New Offices for Oklahoma Gas & Electric Company

The Oklahoma Gas & Electric Company have moved their offices from the Fulkerson Building into the south room of the Buck Tharel Building, Drumright, Okla. The new offices will be equipped with all the latest conveniences.

There will be four apartments to these offices in their new location. In the front will be the lobby. This will be a large and commodious room finished in mahogany. Seats and large chairs will be placed along the sides of the room while two check desks will be placed in the center.

Just back of the lobby will be the auditing room. Connected with this will be the manager's apartment which will be separated only by a low partition. These will all be finished in mahogany. Then back of this will be the superintendent's room and the storage room.

Capacity of Junction City Kan., Plant to be Doubled

The first car load of new equipment has arrived in Junction City, Kan., and the plant there will be more than doubled in capacity. Many extensions will also be made in the lines. The office of the company will be moved to West Eighth Street in the room formerly occupied by the Hurley harness shop. The company will also sell all kinds of cooking utensils.

Providence Company to Enlarge Building at Field's Point

A permit has been granted the Providence (R. I.) Gas Company to greatly enlarge one of its workshop buildings at Field's Point. The additions will add about 10,000 ft. to the floor space, and will be used largely for office purposes. The building will be brick and steel, fireproof, and will mean an expenditure of $40,000.

At present the company has a one-story worshop 32 x 144 ft. in size, with an ell 30 x 44. A second story will be added to this combination, and two new ells, one 31 x 31 and the other 31 x 44, both two stories in height, will be built. Charles B. Maguire Company will do the construction work.

Work Soon to Begin on Thief River Falls New Plant

That a site has been selected for the $50,000 gas plant to be built in Thief River Falls, Minn, and that plans are under way to begin work on the project, is the announcement made by William Glenn, of Sheldon, Iowa, member of the gas company that operates plants at Bemidji, Montevideo and Sheldon. The securing of the gas plant is the result of Commercial club activities and the notification of the franchise grant appeared in a recent issue of the AMERICAN GAS ENGINEERING JOURNAL. The gas plant will be lo-

cated along the Soo tracks on the ground formerly used by the Soo for their ice houses, and will be equipped with all the latest machinery for the manufacture of gas.

It is the intention of the company to erect the walls and roof this fall at least and probably the pit will be dug for the huge tank before the ground freezes. In this way the work of pouring cement for the tank would begin early in April, thus insuring the completion of the plant by the last of June and gas probably would be delivered through the mains by July 1.

Gas Making Started at New Bemidji Gas Works—System Completed

The Bemidji, Minn., Gas Company started its new plant on Oct. 1. The completion of the plant comes after practically a year of work. It was commenced last year but stopped when the cold weather set in. Work was recommenced last May and pushed to completion, over 6 miles of gas pipe being laid throughout the city.

The start in making gas will not mean that right away everything will be in full working order. It will mean that there will be several unforeseen matters which will have to be adjusted in the test before all will be as the company desires and should be. But all adjustments will be made as rapidly as discovered, and as soon as possible, the hitches being such as are in all plants of similar nature.

D. A. Frerichs is the superintendent. He has been in charge of the installation of the plant from its inception. A. P. Allard of Newark, N. J., an expert in gas plants and systems, has been brought to Bemidji to be with the new company. William Nelson of Crookston, gas maker, is also an addition to Bemidji, and will be with the new company. Besides these gentlemen there will be helpers employed at the plant and on the lines.

The plant is located along the Soo railroad, near the stockyards, and was erected specially for the new gas system with all the latest equipment for the manufacture of gas.

The people of Bemidji have taken kindly to the new gas system and property owners were quick to recognize its advantages, connecting their homes and property holdings, adding another valuable improvement.

Progress on Port Arthur, Tex., Plant Improvements

The work on the improvements at the plant of the Port Arthur Gas & Power Company is progressing very satisfactorily. The big reserve gas tank which is under construction is about two-thirds complete. It is expected that the improved plant will be in operation by Nov. 15.

Marshalltown, Ia., May Get Second Gas Plant

The Iowa Railway & Light Company may build a water gas plant for the making of gas from crude oil. An engineer, who has been investigating the coal gas plant, has made his report to the company, the officers of which are considering the advisability of the expenditure, which will be a large one. The water gas plant, if built, could not be put in operation in less than a year, but it would be an auxiliary plant to the old one and would be able to produce gas enough, when operated in connection with the coal plant, to supply largely increased consumption.

The gas coal situation, which does not promise to be put on an easy basis for months, and the necessity for enlarging the capacity for gas production, has made the company turn to the possibility of erecting a water gas plant.

Would Be Large Investment

The investment in a complete water gas plant would probably be $50,000, owing to the present extremely high price of materials that would enter into its construction. Makers of the metal equipment and machinery have reported that they could not make the deliveries earlier than nine months, and several months would be required to erect and put the plant in operation.

With the expectation of eventually erecting another gas plant, the company is storing most of the coke it is producing until it has accumulated an enormous quantity.

The engineer's report says that at the present time the cost of making water gas is higher than for the making of coal gas. But this condition is not likely to exist permanently, and it is said that there will come times when water gas can be made at a lower cost than coal gas. In any event the officers of the company recognize the need of an auxiliary plant, which in a situation such as has existed in the coal market recently, the company could turn to for nearly all its production of gas. In addition both plants operated simultaneously would practically double the output of gas which will be needed in a year or two.

Makes Large Coal Purchase

The inability to get sufficient quantities of gas coal, which has hindered the operation of the plant in its maximum capacity for weeks, is now being relieved, at least for a time. The company has purchased at Milwaukee 1,000 tons of gas coal, which is being delivered here at the rate of a car a day, which is twice the amount consumed daily by the plant. The purchase will be sufficient to supply all the gas coal needed for sixty days. In the meantime, and before lake shipping closes, the company is hoping to be able to purchase an additional quantity sufficient to last through the winter.

Plans Completed for New Bellefontaine, O., Gas Plant

Work on the foundation for the new gas plant at Bellefontaine, O., will begin shortly. Plans have been completed for the work to start by an engineer of Columbus. Much material is on hand ready for use.

One of the big improvements in connection with the new gas plant will be the establishment of a sidetrack upon which coal loaded cars can be handled to the door of the plant, doing away with considerable transportation cost.

More than 15,000 tons of freight will be handled each year to the gas plant and this makes a sidetrack a desirable proposition for a railroad.

New Gas Works at Estherville, Ia.

The municipality of Estherville, Iowa, through their engineers, David G. Fisher & Company, of Davenport, Iowa, E. F. Buhlman in charge, have purchased a Carburetted Water Gas Works of the American Gas Construction Company of Newton, Iowa. Work is to begin at once and to be completed by the first of the year. The generator will be of the latest type of Tenney-Lowe without waste heat boiler. The present installation consists of 30,000 cu. ft. gas holder and low pressure distribution will be used.